

ΓΕΩΠΟΝΙΚΑ.

AGRICULTURAL PURSUITS.

TRANSLATED FROM THE GREEK,

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VOL. I.

Ταυτὴ χάριν αὐτὰ συνήγαγε, ἵνα μὴ δοξῇ τι παραλιπαρεῖν τῶν τοῖς Ἀρχαίοις
σημασθῶν. ΓΕΩΠ. Lib. i. c. 14.

I have written these things for this reason, that I may not seem to omit
any of the things related by the Ancients.

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AUTHORS

OF THE

GEOPONIKA.

JULIUS AFRICANUS, a christian, flourished under Alexander Severus. He was the first of the christians who wrote on chronology, of which Eusebius has left us some fragments. He wrote nine books, under the title of *Κεφάλ.*, in which he treats of medical, physical, and chemical subjects. Eusebius, lib. vi. c. 31, says that one of his epistles written to Origen is extant.

ANATOLIUS is said to have been the preceptor of the Emperor Theodosius.—*Suidas*.

APSYRTUS, the veterinary practitioner, a native of Prusa^a in Bithynia, served under the Emperor Constantine in the Scythian war.—*Suidas*.

APULEIUS. There were two persons of this name; one called Lucius Apuleius, born at Madaura, a city of Africa, who
a 2 lived

^a A city to the south of the river Ascanius.

lived in the reign of Antoninus Pius; the other was Apuleius Celsus, a celebrated physician, who is said to have lived under Augustus or Tiberius. Which of these is cited in this work, has been a subject of dispute among the learned.

ARATUS, of Soli in Cilicia, lived in the reign of Antigonus Gonatus, about the 124th Olympiad.—*Suidas*.

BERYTIUS. It has been imagined that Hermippus Berytius, the disciple of Philo Biblius, who lived in the reign of Adrian, is here meant. *Suidas* also makes mention of Taurus Berytius, a Platonic philosopher, in the time of Antoninus Pius; and of Lupercus Berytius, who lived a short time before the reign of Claudius. Some have supposed that the epithet belongs to Anatolius.

CASSIANUS is said to have made this collection.

DAMOGERON is mentioned by Apuleius, *Apolog.* p. 544. Some of his agricultural precepts are cited by Palladius, ii. xv. xvi. 11, 12. 3.

DEMOCRITUS was called the Abderite, from his native place. He lived about the 80th Olympiad. He wrote on agriculture.

culture. *Columella*, c. 1, et lib. xi. c. 3. He is quoted by Palladius and Varro. He is said to have been cotemporary with Socrates and Hippocrates.

DIDYMUS the Alexandrian wrote fifteen books on agriculture.

CASSIUS DIONYSIUS, of Utica, according to Varro, translated the books of Mago on agriculture ; lib. i. 1. 10.

DIOPHANES, the Bithynian, born at Nice^b, cotemporary with Cæsar and Cicero, reduced C. Dionysius of Utica into six books. Asinius Pollio Trallianus afterwards abridged Diophanes.

FLORENTINUS wrote commentaries on agriculture, which Photius mentions in *Myriobib. Tmem.* CLXIII. He lived under the Emperor Macrinus, about the 218th year of the christian æra.

FRONTO, the rhetorician, lived at Rome under Alexander Severus. He taught at Athens in opposition to Philostratus and Gadareus ; and died there, being nearly sixty years old.—*Suidas*.

HIEROCLES wrote two books concerning veterinary practice, and dedicated them to

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C. Bas-

^b A city to the north of the Lake Ascanius in Bithynia.

C. Bassus.—*Pearsonius Episcop. Cestriensis in Proleg. in Hieroclis lib. de Providentia et Fato.*

HIPPOCRATES, the physician of Coos, is said to have been born in the 80th Olympiad. He flourished under Artaxerxes Longimanus, whose epistle to the prefect of the Hellespont, in which he orders Hippocrates to be sent to him, is mentioned by Soranus in the Life of Hippocrates, and it may be read in Suidas. Hippocrates, a veterinary writer, is respectfully mentioned by Salmasius, in *lib. de Homonymis Hyles*, cap. 58 et 59.

JUBA was the son of Juba, king of Mauritania, who was taken a youth and led in triumph by Julius Cæsar, who took care that he should be taught the liberal arts. Plutarch, in the Life of Cæsar, says that his captivity was no disadvantage to him, in these words: “Then Juba his son, “being quite young, was led in triumph. “His captivity was fortunate to him, “who from the barbarous Numidians “is reckoned among the most learned “writers of the Greeks.”

LEONTINUS, or LEONTIUS, is by Photius called *Λεων*. He is perhaps the same

as

as Leontius Scholasticus, whose epigrams are to be found in the 4th book of the *Anthologia*.

NESTOR, a poet, of Laranda in Lycia, flourished under Alexander Severus; and he wrote the Iliad *λειπογραμματον* and some other things. Suidas has left us this account of him: “ Nestor of Laranda in
 “ Lycia, an epic poet, father of Pisander
 “ the poet, lived under Alexander Severus.
 “ He wrote an Iliad, wanting some books.
 “ Tryphiodorus wrote an Odyssey in the
 “ same way. For in the first book, which
 “ is inscribed A, the letter^c is not found;
 “ and so in other books, that letter, which
 “ points out the number of the book, is
 “ wanting. He also wrote *Metamorphoses*.”

OPPIANUS, a Cilician, was a grammarian and poet. He lived under Antoninus Caracalla.

PAMPHILUS, an Alexandrian grammarian, a disciple of Aristarchus, flourished two centuries before Christ. See *Galen Opera, Basileæ*, 1538.

PAXAMUS wrote concerning the culinary art, in an alphabetical order: two books,
 a 4 entitled

^c The author means the book is deficient.

entitled *Boiotica*; a treatise, called *Dodecatechnon*; two books, on^d the art of dying; some books on agriculture.—*Julius Pollux*, lib. vi. c. 10. *Athenæus*, lib. ix. p. 376. *Columella*, lib. xii. c. 4.

PELAGONIUS, a writer, whom chronology has not fixed to any particular period of time, is often mentioned by Vegetius.

PHILOSTRATUS, the son of Philostratus a Lemnian sophist (who was said to be the son of Verus), was a sophist, who taught first at Athens, then at Rome, under the Emperor Severus. He wrote the life of Apollonius Tyanensis, in eight books.—*Suidas*.

PTOLEMÆUS of Alexandria, a philosopher, lived in the time of the Emperor Marcus. He wrote three books, entitled *Mechanici*, and several other learned works.—*Suidas*.

The QUINTILII, GORDIANUS, and MAXIMUS, who were brothers, lived about the time of the Emperor Commodus, by whom they are said to have been put to death, as it is recorded by Xiphilinus, in Dio Cassius, page 819.

SOTION

^d *De arte tinctoria*.

SOTION is said to have been a philosopher; *Diogenes Laërtius*, lib. x. segm. 4. He wrote concerning rivers, fountains, and lakes; *Photius Tmem.* CLXXXIX. Vossius says, he lived in the time of Tiberius; *Plutarchi Alexand.* p. 699.

TARENTINUS. There were two persons of this name, one called Archytas Tarentinus, mentioned by Varro and Columella; the other was Heraclides Tarentinus, a medical practitioner, a disciple of Herophilus, who is said to have been the first who used compound medicines, and who treated of the doctrine of pulses with any accuracy. Galen makes mention of him; and he seems to think him superior to Antonius Musa, who was physician to Augustus; and he takes notice of his going over to the empiric sect. He is mentioned by C. Celsus among medical practitioners, and by Epiphanius and Dioscorides among botanical writers. He is also mentioned by Hierocles in his *Proœmium* to the *Hippiatrica*.

THEOMNESTUS is said to have been a veterinary writer.

M. TERENCE VARRO was a Roman of the greatest learning, whose three books

on

on agriculture, and whose treatise concerning the Latin tongue, have descended to us.

VINDANIONIUS is by Photius called Vindanius, an agricultural writer, concerning whom the learned have transmitted to us little more than his name, and such things as are ascribed to him in the following publication.

ZOROASTRES, the Persian, was a learned astronomer, who was the first of the sect called *Magi*. He lived long before the Trojan war. There are four of his books entitled *De Naturâ*; there is one concerning precious stones; his predictions from astronomical observations; his five books called *Apotelesmatica*.—*Suidas*. It is doubted whether this is the person mentioned in the following work.

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BOOK I.

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1. **C**ONCERNING the Year, and the division of the Solstices. *By Florentinus.*
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3. Prognostics of tempestuous weather, and from what signs we are to expect rain. *The same.*
4. Prognostics of a long winter. *The same.*
5. Prognostics whether the season will be early or late. *Didymus.*
6. Concerning the month, according to the Moon. *Diophanes.*
7. It is necessary to know when the Moon is above, and when it is below the horizon. Some MSS. attribute this to *Zoroastres.*
8. Concerning the rising of the Dog-star, and the prescience and occurrences from it. *Diophanes.*
9. The rising and setting of the apparent Stars. *The Quintilii.*
10. Prescience of events from thunder every year, after the rising of the Dog-star. *Zoroastres.*
11. Concerning the names of the winds, and how many there are, and from what part each blows. *Dionysius.*
12. Jupiter's revolution of twelve years, and its influence when it goes round the twelve divisions of the Zodiac. *Zoroastres.*

13. Concerning the Sun and the Moon. *Ptolemaeus.*
14. Concerning hail.
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BOOK II.

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2. Young men are most adapted to agricultural labour; and it is proper to make choice of labourers for the different kinds of work, and to select a fit person for each. *Varro.*
3. In what places and situations houses are to be built, and toward what part of the heavens; and concerning baths. *Didymus.*
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5. On the same subject.
6. On the same subject. *Democritus.*
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8. In extensive grounds there ought to be eminences that are wooded, and how they are to be planted. *Apuleius.*
9. What land is best. *Berytius.*
10. Concerning the proving of the soil. *Anatolius.*
11. Another method concerning the proving of the soil. *Diophanes.*
12. What seeds you must sow in a deep soil, what in a middling one, and what in a thinner soil. *Tarentinus.*
13. The kinds of seeds you must sow, where the soil is wet, and in dry ground. *Leontius.*
14. Concerning the season for sowing wheat and barley. *Didymus.*
15. The way to know which seeds will grow with vigour. *Zoroastres.*

16. Concerning the choice of seeds, and what the quality of the seeds that are consigned to the earth, and their age, ought to be. *Vindanionius.*
17. You must sow seeds from situations that are contrary, in situations that are different. *Didymus.*
18. That the seeds, that are to be sown, may not by any means be injured after sowing. *Africanus.*
19. What must be done, and what must not be done, that seeds may be fertile. *Sotion.*
20. How you ought to comprehend if the seeds that are sown are in due proportion. *Pamphilus.*
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22. Preparation of manure. *Florentinus.*
23. The time when you must bring every kind of land into tillage. *Varro.*
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27. Concerning the granary, and the care and preservation of corn. *Tarentinus.*
28. How seed-corn, deposited in granaries, increases. *Africanus.*
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30. Concerning the permanent state of barley; how it may be kept healthy in the granary a very long time. *Damogeron.*
31. Concerning the preservation of meal. *The same.*
32. Concerning the proving of wheat, and how a due proportion of bread ought to be made. *Florentinus.*
33. How to make very palatable bread without leaven. *Didymus.*
34. Concerning ptisane. *Didymus.*

35. Concerning beans. *The same.*
36. Concerning chiche peas. *Eggeston. Florentinus.*
37. Concerning lentil. *The same.*
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39. Concerning lupines. *The same.*
40. Concerning all kinds of pulse, and concerning hemp and flax. *The Quintilii.*
41. That the pulse that are sown, may boil well. *Democritus.*
42. Concerning the lion's tail, which they also call *orobanche. Sotion.*
43. By what plants others are injured. *Paxamus.*
44. Concerning the person who has the care of the farm, or the husbandman. *Florentinus.*
45. The husbandman ought to have an ephemeris of each day's work, and how it is proper that he should arrange the workmen in companies. *The same.*
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47. Concerning the health of the labourers. *Florentinus.*
48. It is not proper to transfer labourers or plants, from more eligible situations, into such as are inferior. *Didymus.*
49. It is expedient to have smiths, and artificers, and makers of earthen ware, on or near the farm. *Varro.*

BOOK III.

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2. In the month of February.
3. In the month of March.
4. In the month of April.

5. In

5. In the month of May.
6. In the month of June.
7. Preparation of alica.
8. Preparation of tragum.
9. Preparation of ptisane.
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11. In the month of August.
12. In the month of September.
13. In the month of October.
14. In the month of November.
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8. Concerning the medicinal and cathartic vine. *Florentinus*.
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4. Concerning climate. *Democritus.*
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10. What day of the moon, and whether, when it is above or below the horizon, it is proper to plant vines. *Anatolius.*
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36. Concerning siderated vines. *Cassianus*.
37. Concerning diseased vines. *Damogeron* ; in the manuscripts, *Damegeron*.
38. Concerning lachrymal vines. *Sotion*.
39. Concerning vines called *ruades*. *The same*.
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8. Another approved method of pitching. *The same.*
9. Concerning the stopping of casks. *Varro.*
10. Concerning the preparation for the yintage. *Didymus.*
11. What they who have the care of the panniers ought to do; and how the grapes are to be trodden; and in what manner they, who are appointed to tread them, must conduct themselves in the presses. *Apuleius.*
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13. The grape-stones being immediately thrown out after the drawing of the must from the press, how what is called *thamna* may be made of them. *Anatolius.*
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8. Concerning the proving of wine and must, if it has water. *Democritus.*
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10. At what times the wines are usually turned. *Paxamus.*
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27. To cure wine hurt by any noxious animal. *Democritus*.
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5. Concerning a nursery. *Didymus.*
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30. The must compound. *The same*.
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33. Concerning the olives called *columbades*. *The same*.

ΓΕΩΠΟΝΙΚΑ.

AGRICULTURAL PURSUITS.

PROEM.

THIS great city has indeed been distinguished by many other useful sovereigns, and it has cherished in its bosom their exploits and virtues as certain treasures of great value; but it will acknowledge that it never had one more eminent than yourself, nor can it display greater achievements than those of your reign; for you esteeming the superintending care of other sovereigns as trifling, exerted yourself, having an eye to the first sovereign of the christians, I mean Constantine, the founder and protector of this city, whom you have greatly excelled in the most glorious actions, and in trophies, and in other achievements: and what you have done for the advantage of your subjects, and for the dispersion of your enemies, would be a task to repeat,

* Constantinople.

repeat, and it would require much time, and a profusion of words. But you are labouring in what is useful in life, and what will be beneficial to posterity; for indeed in the first place you have, by your management and prudence, revived the study of philosophy and rhetoric, which had fallen into disuse, and were buried in deep oblivion, affording them a powerful protection; you afterwards revived the study of all the other sciences and arts: afterwards, knowing that civil government is divided into these three departments, I mean the Army, the Priesthood, and Agriculture, you bestowed no very small diligence on this branch, which is known to give stability to human life; whence by your exalted genius and profound understanding compiling such things as have been with great diligence and experience found out by different persons among the ancients concerning agriculture, and the raising of plants, and concerning the season, and the situation also, and the method suitable to each sort, concerning the finding of water, and the raising of edifices, and in what situations these ought to be built, and toward what part of the heavens, and in what manner, and many other things of equal importance, you have made public a work of universal utility:

utility: for any person meeting with these elaborate treatises, may see those things which exactly suit his way of life, such as are useful and necessary, and by which human life is supported; and he may contemplate them, on which he has every attention bestowed, with great elegance and order; he may see not only things that are necessary, but such as are superfluous, and conducive to please the eye and the olfactory organs: for you being a lover of what is amiable, or rather, if I must say the truth, a lover of the human race, you, by every method and by every attention, collect such things as are useful, always looking forward to the welfare of your subjects. May you, Constantine,^b the most just of sovereigns, the delight and honour of royalty, be happy! may you be prosperous under the protection of the Almighty! and may you prove victorious over your enemies, always studying the consummate happiness of us your subjects!

^b Supposed to be Constantinus Porphyro-Genet^mus.

BOOK I.

HYPOTHESIS^c OF THE FIRST BOOK.

Compiling such things as are related by different authors among the ancients, concerning agriculture, and the care of plants, and of things raised from seed, and many other useful things, I composed this book. It is indeed taken from the works of Florentinus, and of Vindanionius, and Tarentinus, and Anatolius, and Berytius, and Diophanes, and Leontius, and Democritus, and the Paradoxes of Africanus, and from Pamphilus, and Apuleius, and Varro, and Zoroastres, and Fronto, and Paxamus, and Damogeron, and Didymus, and Sotion, and the Quintilii. I have therefore thought it necessary and methodical to arrange the things according to due order, and to prefix to the work things which it is of use to persons applying to agriculture to know, according to priority. I have set down in this first Book such observations as relate to fine and tempestuous weather, and to the rising and setting of the apparent stars, and to effects produced from natural^d causes.

I.—CONCERNING THE YEAR, AND THE DIVISION OF THE SOLSTICES.

IT is necessary that the husbandman should know the seasons, and the change of the solstices; for thus directing the workmen to their proper

^c The title or contents, so called because they were written and set under the composition.

^d Circumambient air, according to the Greek.

proper employment in every season, he will be of consummate service to the soil. Most persons, and among the first, Varro the Roman, has said, that the beginning of the spring is when Favonius generally begins to blow, which is about the seventh^e of the ides of February, the sun being in Aquarius, having attained three or five parts, that is, possessing three or five days in the sign; but the spring is completed on the nones of May: that the summer begins about the eighth of the ides of May, the sun being in Taurus, but that it is completed about the seventh of the ides of August; that the autumn also begins about the sixth of the ides of August, the sun being in Leo, but that it ends about the fifth of the ides of November; that the winter indeed begins about the fourth of the ides of November, the sun being in Scorpio, but that it ends on the day before the eighth of the ides of February. But in relation to the solstices, the winter solstice is about the eighth of

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the

* The Greek writer agrees with Varro in fixing the beginning of the spring; but he does not precisely agree with him in determining the beginning of the other seasons. As Nature has not exactly prescribed the limits between the seasons, it is no wonder the Greek and Roman writers did not fix them within the compass of a day.

the calends of January; the summer solstice is about the eighth of the calends of July, although some will have it to be about the sixth of the nones: and in respect of the equinoxes, the vernal equinox is about the eighth of the calends of April, but some will have it to be about the ninth; and the autumnal equinox is about the eighth of the calends of October, or about the sixth. The rising of the Pleiades begins about the fourth of the ides of June; but their setting is about the fourth of the nones of November. The feast of Bruma is about the eighth of the calends of December.

II.—PROGNOSTICS OF FAIR WEATHER.

THE moon appearing small and clear when three or four days old, portends fair weather; and when full, if it appears clear, it is sign of fine weather; and if when half full it looks clear, it announces favourable weather; but being more red than usual, it is a sign of wind. If any part of it appears blackened, it is a sure token of rain. The sun likewise rising clear is

¹ Columella says, they rose about the fifth of the ides of May, lib. ix. cap. 14.

² This passage seems to be of questionable authenticity.

a sign of fine weather; and when a small cloud appears before it rises, it will be fine; and when it sets, if there be clouds dispersed around it, they are a sign there will be no rain; and when it sets clear without clouds, it is also a sign the following day will be fine; and if the sun sets without clouds, but red clouds are stationed near it afterwards, it will not rain that night nor the following day. Red clouds dispersed about sun-setting are a sure token there will be no rain; and the owl howling incessantly in the night, and the raven making a gentle noise in the day-time, and many crows in company, as it were rejoicing and clamouring, plainly portend fair weather.

III.—PROGNOSTICS OF TEMPESTUOUS WEATHER; AND FROM WHAT SIGNS WE ARE TO EXPECT RAIN.

THE moon being three or four days old, having its extremities obtuse and dark, indicates rain; and its orb appearing red or like fire, is a sign of tempestuous weather: and when it is full, if it appears at all black, it is a manifest prognostic of rain; and if there are

two or three^a wheels around the moon, they are unerring tokens that it will be tempestuous, and especially if they are more than commonly dark. The sun likewise, when it rises red and of a dark hue, portends showers; and when the sun rises, if a dark cloud appears near its rays, it is a sure sign of rain. When the sun also sets, if it has a black cloud near it on the left side, you must expect rain very soon; and thunder and lightning, from what quarter soever they proceed, evidently indicate a tempest from that part. If indeed thunder is heard sometimes from the south and sometimes from the north, and if there are flashes of lightning, wind will ensue; and when aquatic and marine birds are continually washing themselves, they undoubtedly indicate tempestuous weather.

The rainbow appearing double, foretels rain. When sparks^b are also produced on pots and
brazen

^a *Almoe*: this word means, in its primitive signification, threshing-floors, which the Greek and Roman writers recommended to be constructed in a circular form, that, as they were made in the open air, water might the more easily descend from them; for they were of opinion, that if they were made of this form, they would be kept dry with more facility than if they were laid in any other figure.

^b Aratus mentions this circumstance, v. 206.

braken pans, they are certain signs of showers; and the raven washing its head on the sea-shore, and swimming, and vociferating loudly in the night, indicates rain; and barn-door fowls frequently covering themselves with dust, and clamouring, and crows and jackdaws appearing in companies and vociferating, and swallows flying and twittering about pools or fish-ponds or rivers, denote rainy weather; and flies stinging with much vehemence, and geese hastening to their food with clamour, and spiders descending when there is no wind, and the flames of the lamp being of a blackish colour, and the flock wantonly capering, are certain signs there will be tempestuous weather; and the cattle looking toward the south, and licking their feet, and coming to the ox-stall lowing, are manifest signs of rain; and the wolf likewise coming with confidence near the house, and dogs digging the ground, and the^k screech-owl hooting in the morning, are sure tokens of rain; and birds flying toward the sea-coast portend a tempest. Cranes coming forward in a hurry, manifestly indicate there will be a tempest; and mice becoming noisy are a sign of tempestuous weather.

^k Sometimes called the tawny, sometimes the common brown or ivy owl.

weather. When therefore many prognostics concur, your expectation is the less dubious; but you must particularly observe every fourth day of the increase or decrease of the moon, which affect the state of the atmosphere.

IV.—PROGNOSTICS OF A LONG WINTER.

THE holm oaks, and oaks producing much fruit, are true indications that there will be a very long winter; and¹ she-goats and sheep being covered, and wishing to be covered again, are signs of a long winter; and if the cattle dig the ground, and direct their heads toward the north, they forebode a hard winter.

V.—PROGNOSTICS WHETHER THE SEASON WILL BE EARLY OR LATE.

IT is better to know in time whether the season will be early or late; for it is more adviseable to use more seed, when the season promises to be late, because some of the seed perishes in the intermediate interval. If rain then falls after the vintage before the setting of the Pleiades, the season will be early; but if it is showery, when the

¹ See Aratus, v. 336.

the Pleiades set, it is midding; but if the rain begins after the setting of the Pleiades, the season will be late. But Democritus and Apuleius say you must expect there will be such a winter as the day of the feast is, which the Romans call Bruma, that is, the four-and-twentieth day of the month Dios or November^m: some authors also assert from observation that according to the similarity of the four-and-twentieth of the month called Dios, or November, in which the feast of Bruma happens, will be the following month of December; but as the five-and-twentieth day of November will be, such will be the month of January; and as the six-and-twentieth day of the month of November will be, such will be the month of February: but this indeed sometimes happens, and sometimes it is quite the contrary. Some indeed affirm from observation, that from the seventh of March to the ninth of the same month the weather is usually more cold; for on those days the forty martyrsⁿ, betrayed into the hands of the Pagans, suffered martyrdom.

VI.

^m Some critics have been of opinion that the christian emperors transferred the feast of Bruma from December to the month of November.

ⁿ This event took place in Armenia, in the reign of Licimius, A. D. 316.

VI.—CONCERNING THE MONTH ACCORDING TO THE MOON.

SOME think that you are to plant nothing when the moon is waning, but when it is increasing: others indeed advise it to be proper to plant from the fourth day of its age to the eighteenth. Some permit the cultivator to plant on the antelunar days only, that is, on the three first days from the new moon: others avoid planting any thing from the tenth to the twentieth day, lest its light afterwards decrease with the plants. But the precise doctrine with regard to the fore-mentioned observations, and which is of superior utility, is this: to plant, when the moon is under the horizon*; but to cut down wood, when it is above the horizon.

VII.—IT IS NECESSARY TO KNOW WHEN THE MOON IS ABOVE AND WHEN IT IS BELOW THE HORIZON.

As it is necessary that many works in agriculture should get on sometimes when the moon is
above

* *Under the earth* is the Greek expression: it has been supposed by some that *ὑπο γῆν* here ought to be *ὑπὸ γῆν*, and the other member of the sentence *ὑπο γῆν*.

above the horizon, sometimes when it is under it, I have thought proper to demonstrate, from the new moon to the thirtieth^d day, under each day, from what hour of the night and of the day the moon is below or above the horizon. The moon then begins to be under the horizon on the new month from half an hour in the night to half an hour in the day; on the second day, from an hour and a half in the night to an hour and a half in the day; on the third day, from two hours and a quarter in the night, to two hours and a quarter in the day; on the fourth day, from the third hour and a third part in the night, to the third hour and a third part in the day; on the fifth, from the third hour and sixteen parts of an hour in the night, to the same period in the day; on the sixth day, from the fourth hour and nine parts in the night, to the same parts in the day; on the seventh day, from the fifth hour and six parts and a half, to the same division in the day; on the eighth, from the sixth hour and four parts of an hour in the night, to the same parts in the day; on the ninth day, from the seventh hour and eleven parts and a half of an hour in the night,

▷ See Pliny, 18, 32. A synodical month, *i. e.* the interval from one new moon to another, consists of 29 days, 12 hours, 44 minutes, 3 seconds.

night, to the same in the day; on the tenth¹ day, from the eighth hour and eight parts of an hour in the night, to the same parts in the day; on the eleventh day, from the ninth hour in the night, to the same hour in the day; on the twelfth day, from the tenth hour and sixteen parts in the night, to the same period in the day; on the thirteenth day, from the eleventh hour and three parts in the night, to the same time in the day; on the fourteenth day, from that interval to the same time in the day; on the fifteenth, it is in its splendour from the rising of the sun to its setting, when we shall do our work to the greatest advantage in the day-time; on the sixteenth day, from half an hour in the day to the same period in the night; on the seventeenth day, from the first hour and seventeen parts, to the same time in the night; on the eighteenth day, from the second hour and four parts and a half in the day, to the same parts in the night; on the nineteenth day, from the third hour and three parts in the day, to the same parts in the night; on the twentieth

¹ This anonymous section varies so much, particularly from this part, in the printed copies and manuscripts, that it would be no small difficulty to reduce it to a standard within any sufferable approach to correctness.

² Καλλος; literally, very beautiful.

twentieth day, from the third hour and sixteen parts in the day, to the same period in the night; on the one-and-twentieth day, from the fourth hour and nine parts in the day to the same period in the night; on the twenty-second day, from the fifth hour and six parts and a half in the day, to the same time in the night; on the twenty-third day, from the sixth hour and four parts in the day, to the same parts in the night; on the twenty-fourth day, from the seventh hour and eleven parts and a half in the day, to the same period in the night; on the twenty-fifth day, from the seventh hour and eleven parts in the day, to the same interval in the night; on the twenty-sixth day, from the eighth hour and six parts and a half in the day, to the same time in the night; on the twenty-seventh day, from the ninth hour and nine parts and a half, to the same parts in the night; on the twenty-eighth day, from the tenth hour and sixteen parts in the day, to the same division in the night; on the twenty-ninth day, from the eleventh hour and three parts in the day, to the same period in the night; on the thirtieth day, from the setting of the sun to its rising.

VIII.—CONCERNING THE RISING OF THE DOG-STAR, AND THE PRESCIENCE OF OCCURRENCES FROM IT.

THE rising of the dog-star is on the twentieth day of the month of July. You must then observe in^{*} what part the moon is when this rises. If it rises, the moon being in Leo, there will be an abundant crop of corn, and plenty of oil and wine, and all provisions will be cheap. There will be tumults and slaughter, and the appearance of a king, and uncertain weather; and one nation will invade another, and there will be earthquakes and inundations: but being in Virgo, there will be abundance of rain, joy, death of women in childbed; slaves and four-footed beasts will be cheap. Being in Libra, there will be the removal of a tyrant, four-footed beasts will be easily procured, and there will be tumults among the populace, scarcity of oil, and blight among the corn, but plenty of wine and of nuts[†]. Being in Scorpio, there will be discontent in the priesthood,

^{*} The Quintilii in the next chap. say the 24th.

[†] *In what house*, in the Greek. The Arabs make use of the same expression.

[‡] Of fruit, with hard integuments, in the Greek.

hood, and destruction to the apiary, and pestilential havock: when it is in Sagittarius, there will be a plentiful year, and many showers, and abundance of corn, and joy to the human race, but havock in the herd, and a plentiful increase of the feathered tribe: if it rises when the Moon is in Capricorn, there will be marching of armies, and many showers, and abundance of corn, and wine, and oil; all things will be cheap: if it rises when the same luminary is in Aquarius, the dissolution of a tyrant will happen, the wheat will be injured; there will be an incursion of locusts, and little rain, and pestilential diseases: if it rises when the Moon is in Pisce's, there will be plenty of rain, and destruction to the feathered race; and there will be plenty of wine and corn, but disease among the human race. If the Dog-star rises when the Moon is in Aries, there will be much havock in the flock, and much rain, and a scanty crop of wheat, and plenty of oil; if indeed in Taurus, there will be a great deal of rain, and hail, and blight*, and divine wrath; if in Gemini, there will be plenty of corn, and of wine, and of every fruit, and the removal of a tyrant, and destruction to the human race, and

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movement

* *Εἰς αὐτὴν*. The grain affected by it was of a reddish or copper colour.

movement of armies; but if in Cancer, there will be drought and famine.

IX.—THE RISING AND SETTING OF THE APPARENT STARS.

SINCE it is necessary that husbandmen should know the rising and setting of the apparent stars, I have written concerning them; so that persons wholly illiterate may, from memory, know the periods of their rising and setting. On the calends of January, the Dolphin rises; on the twenty-sixth of February, Arcturus rises in the evening; on the calends of April, the Pleiades set late at night; on the twenty-third of April, the Pleiades rise with the Sun; on the twenty-ninth of April, Orion sets in the evening; on the thirtieth of April, the Hyades^{*} rise with the Sun; on the seventh of May, the Pleiades appear in the morning; on the nineteenth of May, the Hyades appear in the morning; on the seventh of June, Arcturus sets in the morning; on the twenty-third of June, Orion begins to rise; on the tenth of July, Orion rises in the morning; on the twenty-

^{*} The old Romans called these *suculæ*, because they thought they had their appellation from *us*.

twenty-third of July, Procyon rises in the morning; on the twenty-fourth, the Dog-star rises in the morning; on the twenty-sixth of July, the *etesiae*[†] begin to blow; on the thirtieth of July, the splendid star in the Lion's breast rises; on the twenty-fifth of August, Sagitta sets; on the fifteenth of September, Arcturus rises; on the fourth of October, Corona rises in the morning; on the twenty-fourth of this month, the Pleiades set at sun-rising; on the first of November, the Pleiades set in the morning, and Orion begins to set; on the twenty-second of November, the Dog-star sets in the morning.

**X.—PRESCIENCE OF EVENTS FROM THUNDER
EVERY YEAR, AFTER THE RISING OF THE DOG-
STAR.**

You must take notice of the first thunder every year, that happens after the rising of the Dog-star. It must therefore be observed in what[‡] division of the circle of the Zodiac the Moon is,

c 2

when

[†] Anniversary winds, which blew from the east:

[‡] In the Greek, in what house:

when the first thunder takes place. If it thunders when the Moon is in Aries, it is a sign that some persons in the country will be under consternation, and that there will be solicitude and flight among the human race, but afterwards tranquillity. If it thunders when the Moon is in Taurus, it is a sign that the wheat and barley will be injured, and that there will be affliction from locusts, but mirth in the royal palace; and to them in the east, vexation and famine. If it thunders when it is in Gemini, it portends trouble and disease, and injury to the corn, and perdition to the Arabs. In Cancer, it is a sure sign of hurt to the crop of barley, and of drought, and of perdition to the herd, but toward March and April of plenty of rain. In Leo, it portends injury to the wheat and barley in mountainous situations, and cuticular and impetigenous complaints. In Virgo, it is the sign of destruction to a tyrant, and that one of another country shall govern; it portends danger to mariners, and blight in the corn-field. In Libra, it is a sign of war, and of abundance of wounds, and of injury to the fruits of the earth. In Scorpio, there will be famine, but the feathered race will increase. In Sagittarius, it is a sure sign of commotion in the country; in mountainous situations,

of

of a good crop of corn; and in champagne grounds, it is a sign of a bad one. In Capricorn, it is a sign that there will be rain during forty days; and it portends treachery of royal powers, and reprehensible conduct, and improper loquacity, and the appearance of another king from the east, who will subjugate all the world; but there will be plenty of fruit, and eminent personages will die, and there will be an increase of the woolly tribe. In Aquarius, it is a sign of violent wars on the sea-coasts, of some injury to other fruits of the earth, but of destruction to pulse. In Pisces, it is a sure sign of some injury to the wheat, and of the death of a potentate.

**XI.—CONCERNING THE NAMES OF THE WINDS,
AND HOW MANY THERE ARE, AND FROM
WHAT PART EACH BLOWS.**

THE four primary winds blow from the four quarters of the heavens, Subsolanus, Favonius, Boreas, and Auster. Subsolanus indeed, coming from the eastern point, has Eurus and Kaikias blowing on each side of it; and Favonius, blowing from the western point, lies between Iapyx and Africus; and Boreas, blowing from the

arctic point, has Thraskias and Aquilo, which confine it in the middle; and Auster, coming from the south, has Libanotus and Euronotus, which confine it in the middle; so that all the winds amount to twelve: but Favonius is more favourable to agriculture than all the other winds; and Florentinus asserts this, and we acknowledge it. The sea, when its waves become high, and when they resound with violence on the shore, foretells wind; and so do the tops of mountains, when they appear clear; and so do thorns and dry leaves, when they are driven in a contrary direction from^a the winds. Thunder and lightning, from what part soever they come, announce wind from that quarter. Where the stars seem to fall, you are to expect wind from that part.

XII.—JUPITER'S REVOLUTION OF TWELVE YEARS, AND ITS INFLUENCE WHEN IT GOES ROUND THE TWELVE DIVISIONS OF THE ZODIAC.

THE circle of the Zodiac is divided into twelve^b parts: three indeed vernal, Aries, Taurus, Gemini: for the summer division there are
three

^a Under, in the Greek.

^b Houses, in the Greek.

three, Cancer, Leo, Virgo; three for autumn, Libra, Scorpio, Sagittarius; three for the winter quarter, Capricorn, Aquarius, Pisces: Jupiter^c therefore, going through every division, has that influence hereafter ascribed to it. When Jupiter is in Aries, being the house of Mars, the whole year indeed will be infested by the north wind, and participating with the south-east wind, the winter also cold and snowy, and there will be perpetual showers and overflowing rivers; but, after the vernal equinox, the temperature of the air changes to gentle and frequent showers, and the summer will be temperate and healthy: but the autumn will be hot, and there will be diseases, and especially in the head, and catarrhs and coughs; champagne situations will produce fruit, but you must pray that there may be no wars. Democritus indeed says, that wine is good and fit to keep, and that the season is well calculated for planting the vine alone; that you must also take care of your corn on the threshing-floors, on account of the showers; that there is a scarcity of the feathered race; and that it is proper to forward your garden plantations. When it is in Taurus, in the house of Venus, the beginning

c 4

^c The star of Jupiter, in the Greek.

ning of the winter indeed will be temperate and showery, but the middle part snowy, and the end of it cold: if it is wintery from the middle of the season to the vernal equinox, the spring will be temperate and moderately wet to the rising of the Dog-star, the summer hot, the autumn frosty and unhealthy, especially to young people, and there will be inflammation of the eyes; champagne situations will be more fertile than such as are mountainous; wine will not be so plentiful, and you must gather the fruit of the vine late in the season; but there will be plenty of fruit on other trees; a scarcity of the feathered race. The year will indeed be unfavourable to mariners: in such a year an illustrious personage will die. Democritus says, there will be much hail and snow in such a season, but that the *etesiae*^d do not blow equally; and you must pray there may be no earthquakes and movement of military force. But when Jupiter is in Gemini, in the house of Mercury, all the year will be infested by the south and south-west wind, and the beginning of the winter will indeed be windy, but the middle of it temperate, and its end frosty and windy; the spring temperate, with moderate

^d See chap. ix.

rate showers, and there will be a good crop of wheat; the summer will be temperate, because the *etesiae* blow briskly for a considerable time. The corn on the threshing-floors will disappoint the hopes of the farmer, especially in Syria; and there will be diseases in autumn, particularly among young people, and the middle-aged, and women; and there will be inflammations of the eyes, when the autumn is hot, and women will die; there will be plenty of fruit on trees, but the fountains of water will become deficient; and it will be proper to lay up the fruit on account of the sterility that may happen the following year. Democritus says the hail will be hurtful, and you must pray that there may be no pestilential diseases. When Jupiter is in the house of the Moon, in Cancer, the winter will be cold, with easterly winds and hail, and dark, having the rivers overflowed; but about the winter solstice the waters will abate, and, after the vernal equinox, there will be much hail, but rough situations will bear more fruit, and the year indeed will be healthy, except in autumn: but Democritus says, that pustular eruptions rise about the mouth in autumn; you must therefore eat herbs in the spring, and take physic, and especially young men, and you must

must drink genuine wine. The olive will be fruitful. When Jupiter is in Leo, the house of the Sun, the beginning of the winter indeed will be cold and wet, with high winds, so that trees will be blown down, but the middle temperate, and the end cold; the spring rather showery, the summer like the spring; and the fountains of water will fail, and pasture will also become scarce for the herd. The autumn will be hot and unhealthy, with catarrhs* and coughs; you must therefore make use of little bread, and more wine; there will be a tolerable crop of wheat; the vine and the olive will be fruitful; the season will be adapted to emplastration, not so well for planting; there will be death in the herd, but an increase of wild animals; a person of distinction will die; and you must pray there may be no earthquakes and wars. When Jupiter is in Virgo, the house of Mercury, the beginning of the winter indeed will be cold, but the middle of it temperate, and the end stormy, having plenty of frost and rain and overflowing rivers, so that many places will be covered^f with water; the spring will be wet and unfavourable to trees,

* From, in the Greek.

^f The Greek word conveys great strength of expression.

trees, and when the spring terminates there will be hail in some places; the summer will be wet and dark, and you must harvest your corn early, that it may not be injured by the rain; the autumn will be windy and healthy; the vine will be fruitful; the season will be adapted for planting the vine; the wheat will be easily injured; the whole year will be healthy, having no disease; you must indeed pray for the fruits of the earth. When Jupiter is in the house of Venus, in Libra, the beginning of the winter indeed will be wet, and the middle temperate and windy, but the end moist and frosty; the spring temperate, but producing complaints in the head; the beginning of the summer like the spring; the year will be dangerous to pregnant women. But Democritus says, that there will neither be overflowing rivers this year, nor much hail, but that the autumn is generally wet. But when Jupiter is in the house of Mars, in Scorpio, the beginning of the winter will be cold with hail, and the middle of it warm, and the end mild; the spring will be cold till the summer solstice; when there are showers and thunders, the fountains of water will be deficient; there will be a moderate crop of wheat; the vine and the olive will bear plentifully; there

there will be disease in the herd. Democritus indeed says that the rivers will be overflowing, and that there will be sickness about autumn; you must therefore pray that there may be no pestilential diseases: he says, you must eat little, but drink more bountifully. When Jupiter is in his own house, in Sagittarius, there will be a temperate and moist winter, neither warm nor cold; the rivers will be full, but when the winter ends there will be cold and wind; the spring will be moist and showery; and the summer temperate and rather cool: but you must secure your threshing-floors on account of the showers: the autumn will be healthy, on account of the blowing of the *etesiaë*; the early and late fruit will be good, but the middle crop faulty; champagne and rough situations will produce a plentiful crop of wheat; the wine that is produced from a late vintage will be fit for keeping; all trees will bear well; the year will be fit for planting, and for all other work; there will be a plentiful increase of large animals, but there will be disease among dogs; the sea will be boisterous, and there will be violent winds late in the season; an illustrious personage will end his career. If Jupiter is in Capricorn, in the house of Saturn, the beginning of the winter will indeed be temperate, but the
middle

middle of it wet and cold, and the end windy; and the waters will be noxious to what is sown, and to other agricultural works; and there will be a general increase of water, and of cold and snow: the summer, before the rising of the Dog-star, will be unfavourable, and, after that, hot and unhealthy; the *etesiaë* will blow strong, and there will be earthquakes; the champagne situations indeed will produce a greater crop; the wine will be spoiled by the frost; there will be a good crop of fruit on trees; the year will be favourable to small beasts, but unfavourable to large ones, especially to oxen: in the autumn there will be diseases from head-ach and from inflammation of the eyes, and from cuticular complaints; and you must pray the fruit may not be hurt by the frost and by the winds. When Jupiter is in Aquarius, in the house of Saturn, there will be much wind, favourable to the crop of wheat, and particularly so to the bearing of trees: the beginning of the winter indeed will be cold, and the end of it windy; the spring wet and winter-like, and frosty, and the summer windy from the violence of the *etesiaë*; and there will be so much rain in the summer, that the crop of corn may be partly overflowed; in the autumn arise winds, attended with rain, and hurtful to the fruit; and there

there will be acute diseases from too much wet, among young people and the middle-aged; and there will be frost, and it will hurt the grapes in many places; but the corn-grounds will be very promising, the early and the late sown: but there will be a decrease of the feathered race and of wild beasts; and there will be numerous shipwrecks; and a person of distinction will die. You must indeed pray that there may be no pestilential diseases, and earthquakes, and thunder. When Jupiter is in Pisces, in his own house, the winter indeed begins with wet, but the middle of it is windy, and its end is attended with hail and snow; in the spring the western winds blow liberally, but the summer will be hot, the autumn excessively hot, particularly unfavourable to women and virgins; and noxious winds blow, so that the fruit on trees is blighted; the corn-grounds will be in good order; you must secure your threshing-floors, on account of the rain; the year is dangerous to women with child. Democritus indeed says that the vine and the olive will be fruitful. You must pray there may be no earthquakes.

XIII.—CONCERNING THE SUN AND THE MOON.

THE Sun, by the power of its own heat, draws up moisture; and the Moon, being of a humid nature, makes a due mixture and temperature. Sotion calls those days of lunar invisibility, from the twenty-ninth to the second day, on which the Moon is hidden^a by the Sun, and it does not appear to the human race.

XIV.—CONCERNING HAIL.

WHEN you meet with the stone^b chalazites, keep it; and, when a hail storm appears, strike it with steel on the opposite side, and the storm will be averted:^c taking also the right wing of an eagle, bury it in the middle of your ground, and neither your vine nor your corn will be injured by the frost: if you also bind one of your most conspicuous vines with a thong from the skin of a seal, no injury happens from hail, as Philostratus relates in his historical treatise.

Some

^a *ὑπο τῶν ακτῶν τοῦ ἡλίου.* Literally, under the rays of the sun.

^b Pliny describes this stone, xvii. 11, s. 73.

^c See Pliny, ii. 55.

Some indeed say that, if you shew a looking-glass before an incumbent cloud, the hail will pass by; or, if you carry the skin of a hyæna, or of a crocodile, or of a seal, around your ground, and hang it before the gates of the house, the hail will not come down: and if you hang a number of keys of dwelling-houses on ropes round your ground, the hail will pass on: and if you place representations of animals in your houses, this will be of signal utility: and if you take a tortoise found in the marshes in your right hand, in a supine posture, having thrown some mould round it, that it may not be able to turn and to get away, for it will not be able if the earth is made hollow under its feet, for having no firm hold it remains on the spot, the hail will not fall on your arable land, nor on any place, when this is done. There are some indeed who say that the tortoise must be taken and deposited on the sixth hour of the day or of the night. But Apuleius, the Roman, says that, having painted a grape on a tablet, you are to consecrate it in the vineyard when Lyra sets, and that your fruit remains unhurt. Now Lyra begins to set about the tenth of the calends of December; indeed it fully sets on the first of the nones of February. These things have indeed

indeed been mentioned by the ancients. But I think that some of these relations are quite inconsistent*, and to be waved; and I advise all persons not to give attention to such things by any means. But I have written these things for this reason, that I may not seem to omit any of the things that have been related by the ancients. Pieces also of the skin of a hippopotamus, set on all the boundaries, prevent the falling of hail.

XV.¹—CONCERNING THUNDER.

BURY the skin of a hippopotamus within your ground, and thunder will not fall there.

* Indecorous, in the original.

¹ I have prefixed XV. to this chapter, which in the original is the XVIth; the XVth, which was on the subject of hail as well as the preceding, being lost.

BOOK II.

HYPOTHESIS.

These things are contained in this book, being indeed the second concerning the select precepts of agriculture, and comprising what things are consigned to the ground; and concerning the different kinds of produce, I mean of wheat and barley, and of other crops that are called pulse, in the following chapters. But I must now first of all begin with that which is of a more general nature.

I.—THE PRESENCE OF THE MASTER IS OF GREAT USE TO THE FARM.

THE continual presence of the master makes the farm much more valuable; for it directs all to attend to their work, and reminding them of such things as are not done, it makes them do their duty; and by praising them who are attentive to their work, and finding fault with them who are tardy, it promotes among all one view of diligence and of affection for what is useful.

II.—YOUNG MEN ARE MOST ADAPTED TO AGRICULTURAL LABOUR; AND IT IS PROPER TO MAKE A CHOICE OF LABOURERS FOR THE DIFFERENT KINDS OF WORK, AND TO SELECT A FIT PERSON FOR EVERY WORK.

EVERY age then has its degree of fitness for agriculture; but boys are particularly adapted by their age, being brought up to work, and serving in inferior capacities, and paying exact attention to every thing that is done; being able, with facility, to bend themselves^m to weed, and to gather leaves and the produce of the earth; learning by experience, practice, and care, from the older labourers. A ploughman indeed must be higher in stature; for such a man, bending forward with power over the plough-tail, presses down the share, so that the furrow may not be too shallow, and the force of correction coming from some degree of height touches the oxen more powerfully. Persons working in the vineyard need not be so tall indeed, but square built;

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for

^m To pull up the agrostis, is the Greek expression.

for such^a a person not applying at an awkward distance to the culture of the vine, but being low in stature, works without fatigue. We are to appoint herdsmen that are strong and tall in stature, and such as have a powerful voice, lest, when they are short in stature, the oxen going before them conceal them, and that they may be able to see what things are before the herd, and that they may terrify the oxen by the roughness of their voice. Goat-herds ought to be light and swift-footed, that they may overtake the goats by their celerity.

III.—. IN WHAT PLACES AND SITUATIONS HOUSES ARE TO BE BUILT, AND TOWARD WHAT PART OF THE HEAVENS, AND CON- CERNING BATHS.

SITUATIONS near the sea are generally more healthy, and such as are on mountains, and such as are on declivities inclining toward the north; but the situations that are near marshes and standing water, and in hollow places, or exposed to the south wind, or to the west, are unhealthy. Habitations then must be built in more exalted situations;

^a This transition is according to the original.

situations ; for such a place is best adapted for health, and for a view* and a prospect. But the whole front is to be toward the east, and the doors, for the winds blowing from the eastern regions are very healthy; and the warmth of the sun coming early rarefies and dissipates the thickness and the haziness of the air. But the edifices ought not to be made too low, nor narrow, but spacious, wide, and lofty. Some persons indeed advise houses to be built towards the south, for the sake of having the sun during a longer continuance; but I say that a building is better raised toward the east, because the south wind blowing from the meridional point, brings wet, and it blows unequally, and it is very unhealthy. You ought, on the contrary, to make your baths not having a view toward the north and the constellation called the Bear, but toward the setting of the sun in winter, or toward the south: and let these be wide and exposed to pure air; for pure air finds its way when a situation is not near dunghills, and places that have an unwholesome smell. The furnaces of these indeed ought to be on the ground, and in the inside inclined, on a

D 3

descent,

* According to the Græc, *view* signifies the things that are seen from the habitation. What I have translated *prospect* means properly the objects that are seen underneath.

descent, that the blocks of wood thrown into them, getting in, may not find their way out, and that the flame confined within may afford much warmth to the boiler.

IV.—OF FINDING WATER.

WHERE the chaste tree, by some called *Agnus*, or the *Conyza*, or the *Othleis*², or *Reeds*, or the *Columbatus*³, grow by themselves, or what is called *Trefoil*⁴, or *Potamogeiton*⁵, or where the bush appears by itself, there dig. But a more useful experiment for finding water is thus made. Let a person dig a trench of the depth of three cubits, in any situation he is pleased, and let him get ready a leaden vessel in the form of a hemisphere, or a caldron; and when the sun is setting, let him rub one of them with oil, and taking some wool, that has been washed, dry, clean,

² So called, because they grew where there was water. The word, in the earlier ages of Greece, it is probable, was written *Υδαίς*.

³ See Galen, l. i. p. 426. Bas. vol. 2.

⁴ *Τριφυλλος*, Matthiol. iii. 106.

⁵ So denominated, because it grew near rivers. See Matthiol. l. iv. 96.

clean, about a handful, let him tie a small stone to the middle of the wool, and let him fasten the wool in the pot with wax, that it may not fall; let him then lay the pot inverted in the trench, taking care that when the vessel is turned, the wool may hang down to the middle of it; and let him cover all the vessel to the depth of a cubit, and let it remain during the night; and in the morning, before sun-rising, taking away what were laid on, let him turn the vessel, and if the place contains water, he will find drops in the vessel, and the wool well moistened with water: and if indeed there is much humidity, so that it resembles tears, the water is near; but if the moisture appear simply, there is water indeed, but at some depth: but if no symptom of this kind appears, you must try the same experiment in another and another place, and fixing, as a man ought, on situations likely to gratify your hopes with respect to water.

V.—ON THE SAME SUBJECT.

HIGH mountains having many tops have water, and especially the parts of the mountains exposed to the north or to Arctos. A black and

rich soil, or one that is stony, and especially if it has stones of a sable hue, and of a yellowish colour, produces water. In champagne situations indeed, where the soil is of potter's clay, abounding with pebbles and pumice-stones, and having a squalid and poor appearance, that is, dry and denudated, there is no water, as well as where it is potter's earth, and such as keeps off and repels showers and storms; but that which receives rain and absorbs it, is still dryer. Water indeed lies under the surface, where the *Agrostis*, Plantain[†], *Heliotropium*, *Butomus*,[‡] Brambles, *Hippuris*[§], Calamint[¶], the small and soft reed, *Callitrichos*[×], which is the *Adiantum*, *Mellilotus*, *Oxylapathus*^γ, *Pentadactylus*^², *Polugonus*[•], or *Platuphullus*, the Rush, *Struchnos*^ᵇ, *Stratiotes*[•],
Tussilago^ᵈ,

[†] *Αρογλοσσον*. Matth. ii. 119.

[‡] Flowering rush or water gladiole. Bod. p. 462. Dodon, p. 591.

[§] Horse tail, Matth. iv. 42.

[¶] *Καλαμινθη*, Matth. iii. 36.

[×] Maidenhair, Matth. iv. 131.

^γ A species of rumex, Matth. l. ii. c. 108.

^² Cinquefoil, Matth. iv. 38.

[•] *Sanguinaria*, Matth. iv. 4.

^ᵇ Matth. iv. 66.

[•] Water soldier, or water aloe, Matth. iv. 97.

Tussilago^d, Chamæleo^e, grow. Where there are indeed many plants standing thick, green and flourishing, the quantity of water will be abundant in proportion. Crabs are useful animals in watery places, for they open the veins, and they destroy leeches. Black and deep earth produces more lasting and more copious veins; and that which is quite a clay produces water, and what is more, that which is sweet. If water appears in a loose soil, you must be satisfied with what there is, and not seek a greater quantity, lest you lament the loss of what there is. Some veins of water indeed rise from below, and some come from transverse directions; but those which spring upwards are more permanent. You must therefore dig to some depth, until the origin of the stream appears, that it may flow without intermission and permanently. The veins indeed which run from transverse directions are less permanent than the others, for they are derived from hyemal and vernal rain. To know whether a soil contains water, some persons do this: having dug a trench, of the breadth of a cubit, but of the depth of three cubits, they lay in the spot that is dug, a dry sponge at noon-day for three hours, and

^d Matth. iii. 109.

^e Matth. iii. 8. 9.

and they cover it with the leaves of green reeds, or with some other tender grass; and if it contains moisture, there will be water; but when it is dry, there will be none. Or you may ascend a more exalted situation, and you must look toward the sun before it rises, before the air is enlightened; and if it seems to draw up any thing misty, before it is rarefied, there will be a hope of your meeting with water. Observe likewise, when the sun first shines, gnats flying straitly upwards and moving, having some resemblance to a pillar, these are also manifest signs of water. You must also observe from a more exalted situation, in the summer indeed, at noon day, when the air is clear, and when the earth is very free from moisture; for at that time a vapour ascends from places containing water, and it seems like a small cloud: such a place truly produces a vapour in the winter, like that which arises from rivers and pools and wells; and the quantities are indeed numerous and resembling clouds, but these are thin and like air. If the water has a bad taste, we are to throw in some bruised coral or pounded barley, and tying it in a cloth we are to lay it in the water. Eels and river-crabs thrown into the water destroy leeches. The signs indeed of good
water

water are the rush, the reed, the lotus^f, and the bramble.

VI.—ON THE SAME SUBJECT.

WE will now speak on the subject of finding, or, as some say, of searching for water. But they who have made experiments in respect to the finding of water, assert that champagne grounds have no water in general, and such as are extensive less than such as are smaller; and that mountains for the greater part abound with water, and that the lowest have more water than the highest parts, and such as are well shaded and covered with trees more than they which are naked. The kinds of water found in champagne situations are for the greater part unsavoury^g; but those in mountains and toward the lowest parts of them, are sweet, unless the taste of some of them be corrupted through the property of the waters that are above them being crude and unsavoury, containing nitre, or alum, or sulphur, or something else of this kind. They also adduce these physical reasons in support of their assertions, that the sun perpetually

^f There is a tree and a herb, each of which comes under this denomination. Matth. i. 134. iii. 106, iv. 106. 107, &c.

^g Αλμυρα, brackish.

ally draws from the water that which is the most subtile and the most light; that the sun indeed having the champagne grounds under its power during the whole day, extracts their moisture and deprives them of their vapour, whence they truly become perfectly destitute of water; and in those in which some portion is left, it is found to be altogether unsavoury, the light and sweet particles being drawn up out of it, as it happens with regard to the sea: but that the water in mountains does not suffer the same inconvenience, because it has not the sun on it during the whole day, and its rays are in an inclined direction to it, and they do not fall on it with so much power; hence the mountains that are inclined toward the north are more exuberant in water than those that are inclined toward the south; and those that are toward the east and west are less so than those toward the north, but more exuberant than those inclined toward the south: and the mountains that are well wooded are more exuberant than such as are naked, because they are shaded; and the inferior streams are more copious, because it is the nature of water to descend and to be collected from exalted situations to such as are low and at the bottoms of mountains; whence there are many fountains and streams in such situations, where
there

there are large and lofty and shady mountains lying above them, having hollow and cavernous places; for in such situations the showers that are collected during the year, and percolated through the earth, increase the fountains; and water sometimes does not appear indeed in these low places, but having made its way for some length under ground, it is propelled into an open situation, and it generally runs in an open channel into the sea. Sometimes water, also conveyed in veins to the sea through the earth for a great distance, breaks out, as the water at Arados^b and Heraclea^c, in Pontus. But they denominate the waters that come from high situations defluous^d fountains, in allusion to the height of them; when a mountain is near, as that called Saokes^e, and having, not far from its top, rough and cavernous places capable of receiving an immense quantity of rain water. They indeed say that others are adventitious fountains for manifest reasons. There are also, in a great many parts of the earth,

veins

^b Strabo gives an account of this, lib. xvi. Geograph.

^c There was a place of this name on the southern part of the Euxine Sea, near Diospolis.

^d They are in Greek called Πέγαι. Varro was of opinion that the Latin word *fons* was derived from *fundo*.

^e A mountain in Samothrace.

veins containing water ; for as they say, in relation to animated bodies, that the whole frame contains veins and is pervaded by numerous arteries, so likewise there are in the earth open places full of air and containing veins of water ; in some situations truly very frequent, and intermixed with each other ; in some more rare, which persons digging wells perpetually meet with, on account of their number and frequency. The springing veins are likewise called fountains, because they are permanent and conveyed from a distance, and receiving a supply of water one from another.

The waters that are collected from showers of rain, and standing in confined and shady situations, as if in vessels, and having no veins flowing from them, are called ponds^m, so that they are not permanent, but speedily become deficient, unless it happens that they are immensely large. But fountains increase and decrease according to the state of the air ; and when a drought indeed happens, the fountains even become deficient ; but when the season is wet they increase, for they receive a supply, as it has been already said, from rain water. Fountains likewise generally increase about the winter solstice, when the sun is not equally powerful and the rain increasing ; but
at

^m ^{Λβ} ~~Αβ~~αδης, so called from the defectiveness of their supply.

at the summer solstice, and at the rising of the Dog-star, the contrary effect takes place. You must distinguish fountains and ponds, when they are found, by some method like this : for a fountain, when found, flows from a generous vein ; at first indeed gentle, but gradually increasing, and when it is increased to a certain degree, it remains the same ; or it flows entirely as it did when it was first found, unless it ceases on account of the state of the air. But they do not say that ponds run in the same manner ; for they at first flow forcibly and copiously, and after a short time they cease. They therefore permit no confidence to be placed in such an appearance as this ; but they order the persons employed in finding water, first of all indeed to try and examine the places where they are engaged, toward what part of the heavens they are situated, and of what kind they are, observing the usual indications, and what things lead to discovery, and other symptoms from the soil and from its produce ; for they say that the reeds springing up, which some call *holosschoinoi*^a, and *butimus*, and brambles, and *cyperus*, which some call *zerna*, and indeed much-thriving *agrostis*^o, and the reeds denomi-
nated

^a Described by Theophrastus H. P. iv. 13.

^o Matth. iv. 28. In French, *dent de chien*.

nated indian, and by some mestokalamoi, by some the bowman's reeds, and the pipe reeds growing thick^p and delicate, are indications that a place contains water; and the ivy likewise growing vigorously, which some call malakokissos^q, and the wild fig, and the willow, and the Argive elm, and the hippuris, and quinquefolium^r, and batrachion, which they call chrysanthemum; and universally if the things that grow (not such as are planted) are of spontaneous production, green, and flourishing, and numerous, they are signs that nourishment is derived to them from water: you must therefore give credit to such signs, and dig, descending lower from these indications, if the place has a supply from which you are to obtain exuberant fountains. The hippuris took its name from etymology, for it resembles a horse's tail, having leaves like the hair, and the stem growing taper from the root to the top; and the stem itself indeed is smooth like a reed, having distinct joints, from which joints, leaves in appearance like hair arise; and from analogy it is likewise called salpington^s.

The

^p i. e. frequent.

^q So called from the delicacy of its texture. Matth. iv. 140.

^r Matth. iv. 38. Πενταφύλλον.

^s Because it resembled the form of a trumpet.

The butimus grows in marshy places, and it produces leaves like those of the leirion, and oxen eat them with avidity; and they grow from one root, not singly, but dispersed. The quinquefolium produces from one root many small shoots, about nine inches long, on which the seed grows; and it has leaves like those of mint, five on each pedicle, and seldom or never more, serrated all round, but a pale flower. The batrachium^t, or chrysanthemum, produces leaves like parsley, but larger, a flower of a golden colour, and the whole plant does not exceed two palms. The malakissos is like the ivy; it has tender leaves, and its stem is covered all around, because it cannot support itself; and it grows principally in reed-plantations, and in deep places. Cyperus, which some call zerna, has leaves like the leek, small when they first appear, and a slender stem like that of the rush; and on the top lies the seed, like the seed of millet: its black root resembles the stones of the olive, having an aromatic taste. When we overlook the indications of these shoots and plants already mentioned, we shall vainly use our endeavours in situations that have no water, either derived from some other source, or fountain, or well-water; but where these plants appear,

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they

they are indications that there is water under the surface; and the more withered they seem in appearance, they are a sign that the water near the surface is not much in respect of quantity, and it is not permanent; but the more luxuriant and the greener they are, they are always certain signs that the water is very deep and permanent. It is expedient also to examine the kinds of soil, for those of the potter's clay, and of the pumice-stone, and such as are squalid, universally proclaim that there is no water; but you are not to draw certain conclusions from those which are glutinous, and of a yellowish hue, and from a clay soil, and from such kinds as are of a black colour and rich, and having strata of pebbles: the strata of pebbles ought not indeed to be lying irregularly in the earth, but horizontally; and in general the kinds of soil of different colours ought to have the strata incrustated and thick: and the beds of earth commonly consist of strata of dissimilar sorts. The stones indeed that are about places which seem to contain water ought to be of a dark colour underneath, not perfectly solid, but in some degree porous; and such as are of a light colour, but lying in a soil such as we have mentioned, have water in the earth under them. Any indeed of the
fore-

fore-mentioned productions are signs there is water; and dissimilar strata of stones have water under them, if they are lying in the situations already mentioned. In ground then abounding with pebbles, and in that which is of a black colour and dense, and likewise that which is adhesive, there must be many ponds on the surface; it is therefore proper to dig drains in such grounds, following the course of the water; for thus plenty of water may be collected. In situations indeed that are of a loose texture and stony, if springs be found, you must be satisfied with them when found.

A person trying for water must also use some method like this: let him have a leaden vessel ready, in the form of a hemisphere, that will hold a congius, and let him take two or three locks of wool well washed and combed; let him tie it in the middle with a thread; and let him fasten the thread with wax to the bottom of the vessel in the inside; but let the vessel be anointed with oil; and in a place where a person may take for granted there is water, forming a conjecture from certain indications, he must dig a hole three cubits deep, and let him set the vessel inverted in the hole; and having laid on some leaves of green reeds or any other plants, he is to replace

the earth to the depth of a cubit. He is to do this when the sun is setting; and having removed the earth in the morning, and having taken away the herbage with caution, he is to turn up the vessel, and to examine it; for if there are fountains, you will find the wool quite moistened and the vessel full of bubbles of air; and you will know the quality of the water, having tasted it when it is squeezed out of the wool. You will indeed find what is pressed out of the wool of a better flavour than that of the fountain, because the most subtile and lightest particles have exhaled. Enough has certainly been said concerning the finding of water.

VII.—CONCERNING WATER, AND HOW RAIN-WATER OUGHT TO BE COLLECTED.

You must indeed bestow attention on water above all things, not only on account of the pleasure of having good water, but likewise for the reason that it renders the air very salubrious in dry seasons: it is therefore truly fortunate to be able to have fountain water; but if you have not it, let rain water be collected, what is sufficient for your own and the family's use, not, as
some

▼ This transition is according to the original.

some have been accustomed to have it, from sheep-cotes, where sheep and other animals fill the cotes with their dung, but from edifices which must be carefully and continually kept clean; and you are to collect pure water in reservoirs through wooden pipes. Laurel^a macerated in water renders it salubrious; and we are to cure bad water thus: let it be put into vessels, and let it remain in the open air until it has settled, and let it be gently removed into other vessels without the sediment at the bottom.

VIII.—IN EXTENSIVE GROUNDS THERE OUGHT TO BE EMINENCES THAT ARE WOODED; AND HOW THEY ARE TO BE PLANTED.

It is certainly an advantage to have in a ground the convenience of an eminence that is naturally covered with a wood; but if this do not happen, it is not a difficult matter to raise plantations on such eminences; for there are seeds of trees that are wild, which being sown will become a plantation, but not so easily in dry situations; for willows and tamarisks, and poplars and firs^v,

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and

^a Daphne.

^v Some have imagined that *αλναι* ought to be *αλνθραι*, i. e. alders, in this place.

and ash-trees and elms, and all trees of a similar kind, thrive in moist situations; and the pine flourishes in sandy places. Experience has indeed taught us that pomegranates and olives alone thrive prosperously in more dry situations; but let oaks and chesnuts, which are called Jupiter's glandiferous trees, be planted in situations that receive plenty of rain water.

IX.—WHAT LAND IS BEST.

THE best land is that, the soil of which is of a black colour, recommended above all, for it is proof against wet and drought. The next is that of a yellowish^{*} hue, and that which is thrown up by rivers, on which they bestow the epithet *mîry*, and that which is sweet, and that which feels warm; for these kinds are known to be adapted to vines and trees, and to the propagation of corn. A deep soil is also recommended, especially if it is friable and not hard to work, and not calculated to the production of trees only; but a red mould is very good for other things, it is not however fit for the production of trees.

X.

^{*} Of the colour of fire, according to the Greek.

X.—CONCERNING THE PROVING OF THE SOIL.

THE proving of the best soil might indeed be done from a sight of it; that is, if in time of drought it is not too much crumbled, or, when impetuous showers fall, it is not too miry, but receives all the rain-water into it; and if, when it is cold weather, the surface of it do not appear too hard, for this may generally be proved to be good. The ancients indeed formed another very useful method of proving what falls under the inspection of the eye; for if the trees that grow naturally in the soil are large and numerous, it may be pronounced to be of the most perfect kind; and if of a middling size, it is not above mediocrity; and if it produces thorns and shoots that are small, and grass that is short, it has no strength, and it is not of much value: others indeed, not satisfied with the discernment of the eye, have found out this kind of experiment from tasting²; having dug to some depth, they take out some of the mould, and they judge of that which

E 4

is

¹ Resembling a shell, according to the original.

² *Ex γουστῶς*. I have translated this according to the Greek. One might think the word ought to be *οσφρητικῶς*.

is of a superior quality from the sense of smelling : but, when not satisfied with this method, having thrown it into a vessel and poured some clean water over it, they transfer the experiment to the real sense of tasting ; for as the water proves to be, after it is mixed, such will be the quality of the soil. / You must then be quite satisfied with the depth of a foot in corn grounds, but of three feet in vineyards, of four feet where trees are planted. Some judge that a soil is good from the *holoschaenoi*, or from the aquatic reed, or from the bramble ; for persons who are in quest of water, likewise give credit to these ; but the most accurate proof is taste ; and, according to the opinion of the ancients, you must give up the soil that is brackish : for as we avoid having salt in compost, and men of experience advise to pour amurca, that is made of olives, that are not sprinkled with salt, over the roots of trees, and to irrigate dung-hills with pure, and not with water that is brackish, it is evident that they disapprove of a soil of that taste, as improper to produce any thing except palm-trees, which it bears of the best growth and the most fruitful : and for this reason the palm tree alone is fruitful in our situations^a, because all of them consist of land of this kind. You must therefore

^a In Phœnicia.

therefore plant palm-trees only in a soil of a brackish taste, or consign it to execration, or do every thing in your power to cure it, using a mixture of virgin^b earth as dung; but you must avoid a soil of an unsavoury smell, which is useless in every respect.

XI.—ANOTHER METHOD CONCERNING THE PROVING OF THE SOIL.

OTHERS indeed prove the best soil thus: having made a trench^c and removed a good portion of the soil, they afterwards throw the mould into the trench again; and if indeed the mould that is thrown in fills the trench, or if it is redundant, they judge that the soil is very good; but if the trench be not filled with the mould that is thrown in, they pronounce that the soil is not good.

XII.—WHAT SEEDS YOU MUST SOW IN A DEEP SOIL, AND WHAT IN A MIDDLE ONE, AND WHAT IN A THINNER SOIL.

It is indeed better to sow wheat in deep land and in champagne ground, but barley in that
which

^b Literally, sweet.

^c See Virgil, Geor. ii. 230. Col. ii. 2, 19. Pallad. i. 5, 3.

which is middling, and pulse in a thinner soil : you may truly sow pulse also in champagne ground, at a future period, after the wheat harvest ; for when thus sown, they having but slender roots, refresh and lighten the soil, the chiche peas being an exception.

XIII.—THE KINDS OF SEEDS THAT YOU MUST SOW, WHERE THE SOIL IS WET, AND IN DRY GROUND.

You ought indeed to sow barley in ground that is not wet, but in such as is quite dry ; and you are to sow wheat in a clayey and in a moist soil, for it will yield a greater increase in such a soil ; but you must not procrastinate your wheat sowing : you must also plant beans and peas in clayey ground, for they are hurt in dry ground before they spring up, and they perish ; and they which do not die, grow degenerate : other sorts of pulse indeed sown in dry ground, bear it, but they become better and more generous when sown in a ground that is well watered.

XIV.—CONCERNING THE SEASON FOR SOWING WHEAT AND BARLEY.

EARLY sowing of all seeds is best; but you must by all means take a soil that is deep first, if it is exposed to air, which affords but little moisture. Now some are of opinion that it is proper to sow from autumn through all the winter, in cold situations, to the ides of March, and even to the vernal equinox, that is, to the eighth of the calends of April. Some persons indeed being more diligent have thus distinguished the periods for sowing, so that they deem it proper to begin sowing barley from the autumnal equinox, which is toward^d the eighth of the calends of October; and wheat from the setting of the Pleiades, which is toward the third of the ides of November; and Quintilius indeed approves of this. But you must finish the sowing of each of these at the winter solstice, which is toward the ninth of the calends of January. But Democritus, transmitting some physical reason for our observation, advises persons to sow chiefly about the setting of Stephanos^e; for not only many showers usually fall

^d Before, according to the Greek.

^e By the Romans called *Corona*.

fall at that time, but the ground has a certain natural power of promoting the growth of the seeds that are then sown. The setting of Stephanos begins commonly in places in Phœnicia, on the seventh of the calends of December. But the sower must avoid weather that is extremely cold, and winds that are excessively bleak; for it is well known that the ground is then compressed, and as it were rejecting with horror the reception of seed; but in favourable weather, that is, when the south winds or other warm winds blow, the earth kindly receives the seeds and disposes them to take root, and causes them to bear plentifully. Some indeed advise to sow when the moon is increasing from the fourth day to the full moon, that is, to the fifteenth day. Some persons judging it to be more safe, do not sow all their early crop at once, but they divide the sowing of it into a second, a third, and a fourth period, aware of the uncertainty of a future season.

XV.—THE WAY TO KNOW WHICH SEEDS WILL
GROW WITH VIGOUR.

SOME persons thus learn beforehand what seeds will come to a prosperous growth: they

sow,

sow, by way of experiment, a small quantity of every seed in some place, a few days before the rising of the Dog-star. When the Dog-star afterwards rises, it hurts some of the seeds that are sown, it is probable, and some it by no means injures: observing therefore this criterion, they sow them which remain unhurt at its rising, and they leave them which are scorched. The rising^f of the Dog-star is on the nineteenth of the month of July. We must then water the seeds that are sown for the sake of experiment, twenty or thirty days before, that they may grow.

**XVI.—CONCERNING THE CHOICE OF SEEDS,
AND WHAT THE QUALITY OF THE SEEDS
THAT ARE CONSIGNED TO THE EARTH, AND
THEIR AGE, OUGHT TO BE.**

WE must choose the wheat for sowing of a good kind, full, firm, and smooth, and resembling gold in colour, and which will yield most flour; but this is proved from the baking of the bread. We must indeed avoid that which is injured and wrinkled. We are also to choose our barley, full and

^{ey} Zoroaster here varies from Diophanes and the Quintilii in book i. chap. 8 and 9. Difference of situation may account for this variation.

and firm, fresh and of a resplendent hue^s, very heavy likewise, and not injured. All pulse also ought to resemble in quality the kinds of grain already mentioned: some persons indeed choosing the largest ears, such as consist of a full and perfect grain, reserve them for the sowing season, being likely to receive a better crop from them. The best seed certainly is that which is a year old; that which is two years old is inferior, but that which is three years old is very bad; that indeed which is older, is not productive.

XVII.—YOU MUST SOW SEEDS FROM SITUATIONS THAT ARE CONTRARY, IN SITUATIONS THAT ARE DIFFERENT.

SOME say that it is conducive to a good crop to sow seeds in situations that are of opposite qualities, as from elevated in champagne situations, from wet in such as are dry, and *vice versa*; for seeds^h as well as the soil love change, but so that we are to transfer them from worse situations into such as are better, but not from those that are better into such as are worse.

XVIII.

^s The Greek implies it was to be of a light colour also.

^h See Pliny, xviii. 24.

**XVIII.—THAT THE SEEDS THAT ARE TO BE
SOWN MAY NOT BE BY ANY MEANS INJURED
AFTER SOWING.**

Sow your seeds, having macerated them in the juice of the sempervivumⁱ, for thus they will not be hurt by birds, or by mice, or by ants, and when sown they improve: and if you sow a little wheat on the outside, all around, having mixed it with hellebore, the seeds that are sown will not be injured by birds: and if you throw some river crabs into water, that is, those which are called *pagouroi*, and let them remain in it during eight days, and besprinkle the outside of your ground that is sown with this water, the seeds and plants will not be injured by birds. If you bruise the leaves of the cypress, and mix them with your seeds, they will be preserved inviolate. Some persons indeed having besprinkled the horn of a stag or of an elephant, when it is dry, and some having macerated it in water, irrigate their seeds. Apuleius also says, that the seeds that are sprinkled with wine will be less unhealthy; and if you irrigate them with water and amurca, you will do what will be of very great service to them;

ⁱ The house-leek; in French, *joubarbe*. Math. iv. 84, &c.

them; but it is better to use physical means; for if the seeds to be sown be put into the measure, in which the seed is measured, and be covered with the skin of a hyæna for some days, receiving physical power and odour from the animal, they will not be easily injured; and if, after sowing and covering the seeds, you mix a little wheat with hellebore and sow it near, whatever birds taste it will die; then taking the birds that are dead, and fixing reeds, hang them by their feet, and no bird will afterward make his approach. If indeed you pound the roots of the wild cucumber, and having macerated them a whole day and a night, you assiduously sprinkle the water over the seeds that are to be sown, covering them afterward with a garment, you may sow them the following day; and when sown, they will not be injured, but they will improve. Vetches will not be devoured, if you mix a little seed of fenugreek with them when they are sown. Virgil recommends to sprinkle the seeds that are sown with nitre^k and water. The seeds that are sown at the full moon remain uneaten. Apuleius indeed says, that having before the digging of your ground carried round it a toad, you are to confine it in an earthen vessel, and to bury it in
the

^k Georg. i. 193.

the middle of your corn ground; and at the time of sowing it you must dig up the vessel, and throw it out of the ground, that the crop may not be of an unsavoury¹ taste. The same Apuleius says, that you are to use a few lentils, to be mixed with the seeds that are sown, for they are by nature unfavourable to boisterous winds; and having dissolved some canine fæces in stale urine, and having besprinkled your corn, or trees, or vines, you will keep them all sound.

XIX.—WHAT MUST BE DONE, AND WHAT MUST NOT BE DONE, THAT SEEDS MAY BE FERTILE.

INSCRIBE on your plough^m what is usual on such occasions, when you turn up your ground afresh, and when you sow it, and the ground will be fertile. They say indeed that it contributes to fertility, to sow your seeds in situations that are different; as, from such as are elevated, in those that are plain, and invertedly. Some persons indeed, for the sake of promoting fertility, sow them when mixed with the dung of the feathered

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¹ Literally, bitter.

^m The inscription, according to the opinion of commentators, was fabricated from פרי אל i. e. the fruits of God.

thered tribe, especially with that of pigeons ; but you must hold this in detestation in dry situations, lest your seeds be burnt. The sower ought to take care that the seeds may not fall on the oxen's horns ; for some call these Kerasbola, and they say that these become steril and imperfect, nor are they to be affected by the power of fire. Seed will be plentifully diffused, if a sieve be made of a wolf's skin, having thirty holes, of a size through which men's fingers may pass.

XX.—HOW YOU OUGHT TO COMPREHEND IF THE SEEDS THAT ARE SOWN ARE IN DUE PROPORTION.

HAVING expanded your fingers, make an impression on the ground ; then withdraw your hand, observe the number of seeds in the impression : for there ought indeed to be seven of wheat at most, and the least number five ; nine, and seven, of barley ; six, and four, of beans : and a number between these limits will evidently be a due proportion. But in ground that is subject to much^a snow, you must sow more abundantly, because some of the seeds perish by the frost.

XXI.

^a Perpetual, in the Greek.

XXI.—CONCERNING MANURE.

MANURE makes good land better, and it will be of greater service to that which is bad; but that which is naturally good does not want much manure; that which is of a middling quality, a little more; and that which is thin and weak, a great deal. Lay not your manure in heaps, but dispersedly. Land that is not manured becomes stiff; when too abundantly manured, it is scorched. The person indeed who manures plants, must not throw the compost on the roots, but he must first apply a sufficient quantity of earth moderately, then the compost; and afterward he must again cover this with earth; for thus the plants will not be burnt, when the compost is applied to them, nor will the heat evaporate, which it would do if it was not covered with earth. The dung of all birds indeed is good, that of geese and of aquatic birds excepted, on account of its moisture; and this, mixed with other kinds, will be useful. The dung of pigeons, possessing much heat, is much preferable to all; on which account some scatter it thinly with the seed, without any preparation, but leaving it as it is; for it is useful to an im-

potent soil, cherishing it and rendering it more powerful for the producing and the cherishing of seeds; and it is destruction to the agrostis. After that of pigeons come the human faeces, having some resemblance to the other, and it is particularly destructive to all weeds; and they prepare it in Arabia in this manner: having sufficiently dried it, they then macerate it in water, and they dry it again: and they are firmly of opinion that it is the most adapted to vines: and it is the better on account of the detestable filthiness of the thing, that it may, by a mixture of it, render the odour of other kinds of manure less offensive. The third is asses dung, being of a very fertile nature, and peculiarly useful to all plants. The fourth is goats dung, being of a very pungent quality; and that of sheep is the next in the scale, being of a more mild nature. After this is ox dung; but the dung of hogs being of superior goodness, is improper for corn fields, on account of its abundant heat, for it instantly burns corn grounds. That which is least expensive, and inferior to all the others, is the dung of horses and of mules by itself; but when mixed with kinds that are more pungent, it becomes useful. It becomes husbandmen indeed to observe particularly, that they do not use compost
made

made the same year, for this is really of no use, but it is hurtful, and it produces many venomous animals. That which is three or four years old is very good, for in process of time it has exhaled what was of a disagreeable smell; and if there is any thing that is indigested, it is rendered mellow. We have in another place given sufficient advice that you are not to manure your grounds when the moon is increasing, lest it co-operate toward the production of many weeds.

XXII.—PREPARATION OF MANURE.

SOME persons having dug a deep trench, bring all their best and worst dung into it, and let it putrify. They also throw over it ashes from ovens, and dirt, and the dung of all animals, and human fæces in preference to all others; and they pour in human urine, which is a very good thing, and when applied by itself particularly useful to all plants, and especially to vines. They likewise throw over it the filth from curriers yards. Many indeed, gathering^r the stubble after harvest, lay it under their cattle, that, when it is trodden down and rendered putrid with their

F 3

urine,

Oruga
• *Laga* sometimes mean serpents.

• Plucking up by the roots, in the Greek.

urine, it may be converted into manure; and they throw it into the trenches with all the things already mentioned. If there is also any dirt, or ashes from chaff, or from thorns, or from wood or from underwood, they likewise throw these in; and having diligently washed the weeds that are thrown up by the sea with fresh water, they mix them together; and after mixing all the things already mentioned, in the trenches, they pour in some fresh water, that they may all putrify together the more expeditiously. They afterward stir them with poles, until they are all mixed together and united, and they become succulent compost: but it is of the greatest utility, if we transfer the rain-water from the roads into our repository for manure; for this muddy and turbid water will increase the manure that is thus laid, and it will improve it by adding much to its state of putrefaction.

XXIII.—THE TIME WHEN YOU MUST BRING EVERY KIND OF LAND INTO TILLAGE.

THE method^a of bringing every kind of ground into tillage is not the same; but that which is condensed,

^a Εξημερωσις. The word seems to me to signify the act of bringing land that was wild into a state of tillage.

condensed, and having numerous roots standing thick, is dug to some depth with instruments adapted to the place, when the weather is very dry; for the ground becomes more friable, and the roots are dried by the excessive heat of the sun, so that they have not the power to take root again; and ground that is deep, and that which is of a firm texture and heavy, and that which is rich, being turned in the same manner in dry weather, are not less benefited; but light ground being burnt by the sun, is reduced to ashes, and all the goodness of it exhales by the scorching heat of the sun: you must therefore work this kind of ground about the autumnal equinox, not with spades nor with digging instruments, but with the plough; and you must immediately manure it, for plenty of manure is of the utmost assistance to it. In Arabia, however, they avoid the tilling of light land, as having but little strength, and becoming rarefied by tillage it is deprived of its moisture; but having first sown barley in *gordat*, in their language, it frequently becomes fruitful, especially when there are many showers. You will in the same manner as you

F 4

have

جَرْدَةٌ in Arabic signifies nakedness among other things, from the verb جَرَدَ. It seems here to be applied to the poverty of the soil.

have done your light land, work that during the winter, which is of a yellowish colour, and that which is of a red hue, and sandy ground, and that which is black; and the white, and the dry, and the light; and that consisting of white potters clay, and such as is situated on hills. Having stirred land that is brackish with small ploughs in the beginning of winter, when it has rained, you will scatter some refuse of straw over it, which is indeed better than bean-halm, for it is allowed to be so; and you will do it afterward with barley and wheat straw: for when they are rotten, the brackish soil being reclaimed and sweetened, no longer sends up that brackish moisture, as it used to do. Having then let it remain during a whole year, you will manure it in autumn with ox and horse dung, which are of a sweeter quality. You will then sow it with barley and pulse that have not deep roots. But work land in mountainous and exposed situations, and in such as are much shaded, and toward the north, during the summer in hot weather, in the same manner as deep land, which we have already said to be better to be wrought with spades: but if working with spades do not seem sufficiently expeditious in a large portion of land that is to be sown, it is in our power to plough

plough it during the summer, beginning in the evening, and continuing all night till the rising of the sun, that the moisture and richness being shaded may remain in the soil; and that the oxen, suffering from the heat of the sun, may not contract disease, and that they may work cheerfully, the soil being rendered in some measure mellow from this nocturnal tillage. The ploughman must indeed yoke, not two, but four oxen; and he must make what is called a double yoke, and he must double and treble it; and he must use a weightier share; that thus the richness of the soil may be wrought sufficiently deep, and that the ground may be properly turned.

XXIV.—CONCERNING WEEDING* WITH INSTRUMENTS, AND HAND-WEEDING, AFTER SOWING.

It is the best method indeed to dig round the grounds that are sown by human aid, that all the seeds may be properly covered; but if it cannot be done, let them be harrowed by means of oxen; and when the crop begins to cover the ground, let it be weeded with instruments, that the weeds may

* *Ξαλάειν* means the act of clearing the ground and covering the seeds with what the Romans called *sarculus*.

may disappear, and that the roots deprived of their moisture may be laid in heaps; and if it is twice weeded, the utility will be double. When it comes into ear, let it be hand-weeded*, for then the produce will be clean and of great value, the soil cheerfully contributing to support it.

XXV.—AT WHAT TIME YOU ARE TO REAP.

WHEN some parts of your corn ground begin to grow yellow, reap all, and especially your barley: but you must reap your pulse much earlier, for they will boil much better, and they will be sweeter; you need not therefore wait till they are all ripe, for if any one thus waits he will lose that which became ripe first, for it will fall off when it is reaped. Drier corn is indeed fitter for keeping, but it is less in quantity; but that which is of a yellowish hue is sweeter for eating, and the chaff from it is more grateful to the cattle. It is proper to collect all your crop early in the morning, when the dew is upon it. Wheat indeed and barley, that are winnowed,

must

* This was expressed by the word *βoranζισδας*.

† In some copies thus: "The soil not loving to cherish weeds."

must be left on the threshing-floor a day or two, or a whole night; and it is proper to remove them before the rising of the sun, that the grain may be deposited in the granary when cool, for this greatly contributes to its keeping.

XXVI.—CONCERNING THE LAYING OF THE THRESHING FLOOR.

It is proper to make the threshing-floor on an eminence, that it may readily receive the wind; and you ought above all things to take care not to build the threshing-floor exposed to the wind near buildings or gardens; for the winds blowing the minute particles of the chaff unobserved into men's eyes, inflame^v the pupils, so that many persons have been deprived of one eye, others indeed of both. The chaff is also hurtful to fruit-trees, and especially to vines; for as manure, so is chaff indeed applied to the roots: but it is very hurtful to the branches and to the leaves; and it is not less injurious to pot-herbs, for when it rests on them it perforates the leaves, and these, when perforated, wither^v. It is of utility to sprinkle
amurca

^v Inflame, according to the original.

^v Are burnt, is the Greek expression.

amurca over the threshing-floor from time to time, and to level it with a cylinder, for then ants will not injure it. Let the grain that is laid on the threshing-floor be exposed* to the south; for it will be fuller, and it will be wrought out with more ease.

XXVII.—CONCERNING THE GRANARY, AND THE CARE AND PRESERVATION OF CORN.

CORN is properly kept in lofty granaries having light from the east; and let the place have a moderate portion of air from the north and from the west, and let it be turned from the south and from such winds: let it also have a number of air-tubes, through which the warm air may exhale, and that which is cool may enter: but let it not be exposed to moisture, or to any unsavoury smell, or to disagreeable stench; and let it particularly be at a distance from stables, and from ox-stalls, and from every kind of heat. Let the walls be plastered with clay mixed with hair and straw; let them be afterwards covered within and without with that which is called potters clay; and having after this macerated
the

* Have its section, in the Greek.

the roots and leaves of the wild cucumber in water during two days, and having wrought that which is called sand mortar with the water, carefully plaster the inside: some likewise mix the mortar with ox-stale, as being destructive to noxious creatures; and they sprinkle urine over the testaceous coat that is laid on the pavement. Some sprinkle ashes of shoots of the oak over the corn; others, dried cow-dung; some lay on dry shoots of absinthium or of abrotanum, and some indeed the dry leaves of the sempervivum. It is better to sprinkle amurca over the sand mortar, for this destroys all noxious animals, and it makes the corn more firm and more dense: some persons therefore, having boiled amurca to half its quantity, sprinkle it over the walls; then suffering it to dry, they lay in their corn. But the best way of all is to prepare dry potters clay, or leaves of the pomegranate dried and sifted; and when the corn is deposited, to sprinkle a *chænix*¹ of the potters clay, or of the leaves over each *medimnus*² of corn. It is indeed of very great service to strew some conyza on the floor under the corn, and after throwing on ten measures of conyza, then to lay the corn on it till all

is

¹ One pint + 15. 705 $\frac{1}{4}$ sol. inch.

² 4 pecks, 6 pints, 3. 501 sol. inch.

is deposited; for what is thus deposited not only remains during many years in a state of integrity, but it will also preserve the same standard in baking. Corn indeed, when grown old, becomes by its nature of a very dark^a colour, and of an unsavoury^b taste, whence it requires the attention prescribed.

XXVIII.—HOW SEED CORN, DEPOSITED IN GRANARIES, INCREASES.

CORN will increase in measure thus: having pounded and mixed some nitre and aphronitre with some light earth, throw them over the corn, and this will preserve it unhurt. Some^c indeed mix the nitre and aphronitre with vinegar.

XXIX.—THAT ANTS MAY NOT TOUCH SEED CORN.

ANTS do not touch seed corn, if you will circumscribe your store with white earth, or if you lay wild origanum around it.

XXX.

^a Black, in the Greek.

^b Bitter, in the Greek.

^c This passage is not in the MSS. nor in the ancient Latin copy of Cornarius, nor in the Italian translation of Vitelli.

**XXX.—CONCERNING THE PERMANENT STATE
OF BARLEY; HOW IT MAY BE KEPT HEALTHY
IN THE GRANARY DURING A VERY LONG
TIME.**

DRY leaves of the fertile laurel, and all kinds of ashes, especially from blocks of the laurel, being laid on, will preserve barley unhurt. The plant sempervivum also being dried and mixed with calaminth and gypsum, along with the barley, will preserve it. Some indeed having filled a vessel with vinegar, and having set on a cover, place it in the middle of the barley. It may be proper to know that barley, when grown old, becomes of a bitter taste.

**XXXI.—CONCERNING THE PRESERVATION OF
MEAL.**

MEAL remains unhurt for a considerable time, when pieces of gummy trees are prepared and thrown into it. Some persons indeed, pounding cumin and salt in equal quantities, and making dry pellets of them, lay them in the meal.

XXXII.

**XXXII. — CONCERNING THE PROVING OF
WHEAT, AND HOW A DUE PROPORTION OF
BREAD OUGHT TO BE MADE.**

HAVING carefully cleaned and winnowed the wheat that is sound, weigh it; and if you find a modius weighing forty pounds, expect the same weight of dough; for what will be diminished by taking away the bran in grinding, the water, that is sprinkled over it in the rest of the process, will add to it. The baking of the bread indeed takes away a tenth^d and a twentieth part from the standard; so that, in the baking of it, it is diminished a pound and a half in ten pounds. You must indeed take away the same proportion for the baking in the best bread, and in that of the second quality.

**XXXIII. — HOW TO MAKE VERY PALATABLE
BREAD WITHOUT LEAVEN.**

SOME make bread without leaven, making use of nitre, for nitre makes bread as well as meal more fit for digestion. Others indeed make bread without leaven thus: they put some grapes in
water

$$^d \ 10 + 20 = 30 \quad \frac{3}{2} = 15 \quad \frac{15}{10} = 1\frac{1}{2}.$$

water the day before the baking, the day following they take the wet grapes, and press them, and they use the flowing liquor instead of leaven, and they make the bread sweeter and finer. But if you wish to have leaven for a whole year: when the must ferments in the casks, take that part which froths on the surface, and mix it with the flour of millet; and having carefully pounded it and made it into pellets, dry it in the sun, and set it in a moist place, and take what is sufficient of it, and use it instead of leaven. All bread that is made without leaven, is of the greatest efficacy in promoting an exhilarating flow of spirits. Florentinus indeed says that the bread denominated *Clibanites**, made thin, and dried in the sun, is easily digested, but the bread which is baked in ovens is of more heavy digestion.

XXXIV.—CONCERNING PTISANE.

HAVING decorticated the barley, dry it in the sun; and having also pounded it, dry it in the sun;

VOL. I.

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and

* i. e. baked on the *clibanos*, which was a round utensil for baking, made of metal. Κλιβανος ουνος τι σιδηρον, σφω κατ' αυτον οριστοι πυρρονουσιν και τυραντουσιν αυτον. Casiodorus says: *Clibanus etiam erat coquendis panibus ancti*

and when you lay it up, sprinkle over it the fine meal that came from it in pounding it, for it will preserve it. Ptisane, taken when it is moist, is very nutritious, it is said by Florentinus.

XXXV.—CONCERNING BEANS.

Do not plant beans near the roots of a tree, lest the tree be dried. But you ought to plant beans late, and they like a clay soil. That they may boil well, sprinkle water with nitre over them. Physicians indeed say that beans make the persons that eat them heavy: they also think that they prevent right dreams, for they are flatulent. They likewise say that domestic fowls that always eat them become barren. Pythagoras also says that you must not eat beans, because there are found in the flower of this plant inauspicious letters. They also say that a bean that has been eroded becomes whole again at the increase of the moon: that it will by no means be boiled in salt water, nor consequently in sea water. Am-
phiarus

vasculi deducta rotunditas, quæ sub ardentibus flammis ardet intus. Galen says that this bread was more wholesome, because it was more equally baked than that which was baked in the oven, *et cetera.*

philaus^f was the first that abstained from beans on account of the foretelling of events by dreams. The following words are likewise ascribed to Orpheus :^g

You sons of misery, from beans refrain :

Your hands a parent's blood as well might stain.

Beans besprinkled with sea water, and when irrigated with water of Magudaris^h, will be preserved unhurt.

XXXVI.—CONCERNING CHICHE PEAS.

If you macerate chiche peas in warm water the day before they are sown, they grow larger ; but some bestowing greater attention on them, wishing to have their chiche peas much larger, sow them, having first macerated them with their integuments in water mixed with nitre. If indeed

G 2

you

^f Son of Oecus and Hypermnestra, an Argive, soothsayer and augur. *Cic. de Divin.* 1.

^g Some have ascribed them to Empedocles. See Athenæus, lib. ii. v. 2. The drift of these verses may be, that the eating of beans is as unfavourable to right dreams as the crime of parricide, which might be unlikely to promote such dreams or undisturbed repose.

^h Supposed to be the root of *Laserpitium*.

you wish to have them early, sow them about the time of barley-sowing; and that no person may be able to eat them when ripe, having properly mixed the seeds of the wild cucumber and absinthium with water, besprinkle them during five days early in the morning, for the dew washes away the bitterness in five days more.

XXXVII.—CONCERNING THE LENTIL.

LENTILS smeared with cow-dung before they are sown, will grow better and more speedily. The lentil grows larger in the integument, if besprinkled with warm water and nitre when sown. It remains sound when besprinkled with vinegar mixed with the juice of laserpitium. The Egyptian lentil affects the spirits of the persons that eat it.¹

XXXVIII.—CONCERNING MILLET.

MILLET loves a soil that is miry and wet, and sandy ground, if it be frequently watered. A little seed

¹ The meaning of this sentence is subject to ambiguity. The Greek is *αδύμιας πειρίου*. The learned say the first word ought to be *αδύμιας*, because Galen, Dioscorides and Theophrastus say that the lentil causes dejection of spirits, &c.

seed indeed is sufficient for a whole ground. It likes to be weeded with the sarculus, and to be hand-weeded continually. It is sown from the vernal equinox, which is before the ninth of the calends of April. If it happens to be sown too thick, it will be detrimental to it: for a *plethron*^{*} does not take more than a handfull¹ of seed. In weeding, it is proper to take up the weeds with the roots; for a *plethron*, thus managed, will certainly produce forty *modii*.²

XXXIX.—CONCERNING LUPINES.

It may be proper to sow lupines before other kinds of pulse, after the autumnal equinox, when the rainy weather is past. Drive in your cows before they are in blossom, for they will feed on every other herb, but they will not touch these on account of their bitter taste. Apuleius indeed says that they are driven^a about with the sun every day, and they demonstrate the hours of the day to husbandmen, although the air is clouded.

G 3

Lupines,

^{*} A measure of about 120 square feet. Plutarch uses it to express the *jugerum*.

¹ i. e. a small quantity.

^a A *modius* contained one peck, 7. 68 sol. inches.

² Pliny mentions this, lib. xviii. 36. 67.

Lupines, when sprinkled with sea and river water, during three days are rendered sweet; and, when they begin to become sweet, being dried and laid up, they are given with chaff for food to cattle. They are good for making bread, when barley or wheat flour is mixed with them. You must sow lupines in poor ground, and they want no manure, for they are turned into manure because they serve for compost to all poor land, and they render it fertile in future. They blossom indeed thrice°. It is proper to reap them after rain; for when they are dry, they get out of their integuments, and are wasted. When pounded and applied to the navel, they are an antidote against worms. Let them not be sown too deep; and they flourish like the caper, although neglected; but they do not thrive so well, if the ground is too assiduously wrought.

XL.—CONCERNING ALL KINDS OF PULSE, AND CONCERNING HEMP AND FLAX.

PULSE like to be planted in a dry soil, beans excepted, for these love places that are watery and

° About the end of May or beginning of June, about the end of June or beginning of July, the third time in July or August.

and abounding with moisture. Hemp indeed delights in hollow situations, and in such as are always wet. It is sown from the rising of Arcturus, which is before the fourth of the calends of March, to the vernal equinox, which is before the ninth of the calends of April. Flax also likes places that are miry, but it is sown from the autumnal equinox to the day before the nones of January.

**XLI.—THAT THE PULSE THAT ARE TO BE SOWN,
MAY BOIL WELL.**

IN sowing them you are to mix nitre with the manure, for thus you will make them fit for boiling; but if, having done this, it do not succeed, and you wish your pulse to boil readily, throw a little mustard into the pot, and the things that are boiling will soon become tender, whether meat or pulse; and if you add more mustard, they will be in a state of solution.

G 4

XLII.

* The rising of Arcturus is again mentioned in this place, but it does not seem to me to be accurately fixed; for Pliny says, *Pridie Nonus Januarii Cæsari Delphinus matutino exoritur*, lib. xviii. 26, 64. Ætius corroborates this opinion, iii. 164. As this rising of Arcturus appears to me to be of dubious authority, I have omitted it in the translation.

**XLII.—CONCERNING THE LION'S TAIL, WHICH
THEY LIKEWISE CALL OROBANCHE.**

THE osproleon, which some call orobanche, will not grow in grounds, if you fix branches of the rhododaphne at the four corners and in the middle of the field.

This will also preserve all kinds of pulse in safety; and if you wish this plant totally to disappear, take five shells, and describe on them with chalk, or with some other white pigment, Hercules suffocating the lion, and set them at the four corners and in the middle of the ground. There is another physical remedy working by contrary affection, and to which Democritus gives testimony, and says, that when a lion or a wild beast looks attentively at a cock, and he is in a state of consternation, if any person takes the cock and goes round the place, the leonine plant soon gives way, and the pulse improve, as if the plant were intimidated by the cock. Some persons indeed, learned by experience,

* According to some MSS. this passage runs thus: "Let a marriageable virgin, having her body and feet naked, without any the least clothing, with dishevelled hair, go round the field," &c. &c.

rience, advise to besprinkle the seeds that are to be sown with the blood of the cock, and they will not be hurt by the leonine plant: but some paint this on a shell, and place it in the middle of the ground. It is certainly proper to take care that the pulse that are sown may not touch the horn of the ox, for they become barren and of no use.

XLIII.—BY WHAT PLANTS OTHERS ARE INJURED.

~~On~~ The orobanche kills beans and chiche peas by twisting itself round them. Darnel, which is called *aira*, kills wheat; and mixed in the bread; it makes them who eat it blind. *Ægilops* is hurtful to barley; the plant called *pelekinos* hurts the lentil.

XLIV.

* This passage seems to be imperfect. It probably alludes to Hercules and the Lion.

* Probably, from the havock it made.

* Wild barley, Matthioli Comm. iv. 134.

* The hatchet vetch, Matthioli Comm. p. 342.

**XLIV.—CONCERNING THE PERSON WHO HAS
THE CARE OF THE FARM, OR THE HUSBAND-
MAN.**

THE person who is entrusted with the care of the farm must be an example to all the workmen, that looking up to him, and to his life and morals, they may rather respect than fear him. Let him be honest, hospitable, abstaining as much as possible from wine, for the drinking of too much wine brings on forgetfulness; let him not be too covetous, nor insatiable with respect to usury, but contented with what is moderate, and always supplying the persons that want them with such things as are necessary; vigilant, and apt to get up before the rest of the family; careful not to lie, and particularly so not to swear to what is false; pious, attentive to the customary rites, not treating the consecrated^v groves, nor any

^v Consecrated trees, literally. In the ancient Roman writers we read of the consecrated groves; and P. Cato has left us an account of the ceremony to be observed at the cutting down of one of them. Virgil mentions the religious respect which the Greeks had for the oak:

Et habitæ Graiis oracula quercus.

Moses also takes notice of the primitive mode of worshipping in groves, Deut. xii. 2, 3. The Gauls, who transmitted their

any thing of the kind, with contempt, but exhorting all to get ready to the acts of religion; and indeed in time of work let him be attentive, and in time of recreation let him be affable and indulgent, permitting the holidays to be observed every week, and suffering nothing of importance to be done at that time, but compelling the men to rest, and particularly on the monthly and yearly feasts; let him not barter for other men's labour, nor, let him receive the profit of his master's ground, nor let him accommodate every person at his master's expence; let him be obedient to his master's commands; and if he finds any thing more adviseable, let him first refer it to his master, unless the utility of the thing so ties him down that he cannot await his master's orders.

XLV.

Language and their religious rites to the Britons, derived the former from the East; and in conformity to the construction of the eastern languages, it had no present tense, and it abounded in oriental words, consisting of radical letters. It appears, from this and other passages in the Greek writers, that the worship of the Druids of Britain in groves does not seem to have been indigenous. The following passages in the Scriptures seem to countenance this opinion: Gen. xviii. 1. Gen. xii. 6. Judges, ix. 6. Joshua, xxiv. 26. Hosea, iv. 13. Ezek. vi. 13.

**XLV.—THE HUSBANDMAN OUGHT TO HAVE AN
EPHEMERIS OF EACH DAY'S WORK; AND HOW
IT IS PROPER THAT HE SHOULD ARRANGE THE
WORKMEN IN COMPANIES.**

LET the husbandman have a diary accurately drawn up for the general perusal of the workmen employed in agriculture, and an account of all the days in every month, that from this he may be able to know and to remember how he ought to go on with the work, no time being lost; for if he omits but one day, he will confound the arrangement of the labour, and he will not only hurt the present crop, but he will render the soil less estimable. If there are indeed many workmen, they must not all work together, for they will with facility combine to work negligently; nor yet two or three, for they will want many persons to preside over them. Let them not work all together nor too few in number, but it is proper to proportion the number and the persons that preside. It is the best way indeed, if there are many, to distribute the workmen into *decades*^v; but if few, into companies of six, and not into companies of five; for when the men that dig are
of

^v Companies of ten.

of equal number, the consequent labour will be preserved in the same degree of equality; and the men that are more indolent lifting up and laying down in one regular process of raising and depositing, are under the necessity of making themselves equal to those who are more active.

XLVI.—CONCERNING PROPORTION OF LABOUR.

SOME have observed, whether in vineyards, or in a plantation of roses, or in a garden, or in any place prepared for a plantation, and dug to the depth of three feet, that seven workmen are sufficient for every plethron^{*}; but in a soil that is very stiff, that eight men are required: and that a plethron also of old vines in ground easy to be wrought, and not abounding with weeds, and on a declivity, is frequently wrought by three men; but in one that is more stiff and full of weeds, by eight workmen: but fresh plantations have been often wrought by three men during the first five years. The Aminean vine is cultivated with more facility, but the Surentine is quite the contrary, for this wants more workmen. Persons that have made the experiment,

^{*} A plethron here seems to be what the Romans called *jugerum*.

experiment, affirm that a plethron may be ablaqueated by four workmen; the ablaqueation* being made, the breadth indeed two feet and a half, but the depth a foot: and this has been observed to be the best calculation. It has also been observed that a plethron may be pruned by four men; and that the first pampination* is performed by one man, and the second is much less trouble. Moreover all the old writers bear testimony that it is impossible that more than eight plethra of vineyard should be cultivated by one vine-dresser, although a good workman, nor is it to be permitted.

XLVII.—CONCERNING THE HEALTH OF THE LABOURERS.

It certainly would be useful if you also appointed a physician for the use of the farm: but if you do not, you are to cure the diseases incident to the human frame, by making observations on those who have laboured under a similar disease; for they who inhabit the same country, and who partake of the same diet, if they should fall

* The act of digging round the roots of vines.

z Βλατελογια, the act of removing the useless shoots.

fall into the same diseases, will likewise be cured by the same remedies. But it is better to prevent the diseases of the workmen, and to anticipate a cure, as much as possible. As the sun is hurtful to the bodies and to the circulation of men who are at work in the heat, and not having some defence against it; it is proper to lessen their allowance of victuals, that they may eat it, not at once nor at two periods, but a little and often; for this is salutary and very favourable to digestion. Some boil rue and wild mallows, and mix wine that is turned with this liquor, and give it them with their victuals. Some indeed mix milk and water, and pour a little sour wine into it, and they give it them before they eat; and they do this from the beginning of the spring till autumn: others give them wormwood wine, and this may be taken not only before, ^{but} likewise after, and at the time of eating. But if we have not this wine, we are to give them some wormwood, having thrown it into water and boiled it. Squill wine has the same effect. They likewise prepare squill vinegar; and if indeed you are going to give the squill wine, you are to give it before eating; but if squill vinegar, after supper. The marsh wine, that is, what is made in marshy situations, is exceedingly wholesome, preserving those who use it

it in good health. Ptisane is also very nutritious, and it is wholesome; and the bread called Clibanites, made thin, and dried in the sun, is very conducive to health: but the bread which is baked in what are called ovens, renders digestion more heavy. If the water also is not good nor fit for drinking, but unwholesome, let it be boiled until the tenth part of it be wasted; let it be cooled, and it will then be innoxious: for that sea-water also being boiled is rendered sweet. As venomous animals likewise perpetually infest labourers, such as vipers and phalangia^a, and serpents, and the poisonous mures aranei^b, and scorpions^c, although they may be considered as domestic: the labourers must be persuaded that the vine called *theriaca* affords a sufficient remedy against all the attacks of such animals; for not only the wine made from the *theriaca* will assuage the pain of the person that is bit; but vinegar also from it, and its grapes, and the dried grapes.

^a Now called *tarantule*, from Tarentum, in Apulia, where they are numerous. Matthioli Comment. 294.

^b They are common in Italy; the inhabitants call the animal *topo ragno*. Matth. Comment. 298.

^c Matthiolus enumerates the different sorts, and prescribes remedies for the bite of these animals. Com. 253 and 1018.

grapes are efficacious; and the ashes of the leaves ~~and of the shoots~~ that are burnt, applied to the bite, will assuage the pain, and will save the patient. The efficacy of the ashes of all the shoots of this vine is so powerful as to cure the bite of a dog, and frequently when he is mad. The power therefore of the theriaca, when applied, demonstrates the efficacy of the remedy. But how the theriaca may be prepared, and the wormwood and squill wine, shall be sufficiently shewn in their proper places.

XLVIII.—IT IS NOT PROPER TO TRANSFER LABOURERS OR PLANTS FROM MORE ELIGIBLE SITUATIONS INTO SUCH AS ARE INFERIOR.

SOME advise not to remove plants and labourers from healthy situations into such as are unhealthy, but rather from worse into such as are better, or similar, or into such as are not much inferior; for a change appears strange, and is disagreeable to persons removed to a worse situation. This is observed by persons of the first discernment, not only in relation to men, but likewise with respect to plants.

**XLIX.—IT IS EXPEDIENT TO HAVE SMITHS,
AND ARTIFICERS, AND MAKERS OF EARTHEN
WARE, ON OR NEAR THE FARM.**

It is inconvenient that the workmen should go to towns for the sake of procuring tools; for want of instruments, when perpetually deferred, will be an obstacle to the labourers; and a continual travelling to the city makes a man more idle. It is therefore proper to have smiths and artificers either on the farm, or near it; and it is very necessary to have makers of earthen ware for general use, because it is well known that potters earth is to be found in every ground; for you will find earth fit for the making of potters ware, either on the surface, or under it, or in some recluse parts and situations on a farm.

BOOK III.

HYPOTHESIS.

The following things are in this Book, being indeed the Third, in relation to the choice Precepts of Agriculture, and comprising the Work adapted to each Month.

*A DIARY, AND WHAT OUGHT TO BE DONE
EVERY MONTH.*

I.—IN THE MONTH OF JANUARY.

IN the month of January it is proper to prune the arbusta, avoiding the early and late hours of twilight. In the same month you must cut down timber for building and common use, when the moon is in conjunction^d and under the earth; for the light of the moon makes timber less hard; but that which is cut down at that time remains sound. In the same month you must manure fruit-bearing trees, but the compost must not touch the roots. You will in the same month insert the trees which blossom first, as the duracina, the damascene^e, the apricot, the almond,

H 2

the

^d i.e. with the sun.

^e Commonly called *damson*.

the cherry. In this month you must also prune the vine called *chamitis*^f, with very sharp knives, in fine weather^g. You must plant vines and other trees from the ides of January, as long as the aptitude of the situation admits the plantation. In this month you must not sow, for the earth being impotent and heavy, becomes vaporous, and it has some resemblance to wool that is ill set out of hand. You are to manure medica, and to cut the green cytissus. Now before manuring, turn with small ploughs, and then immediately manure it, dry, and light, and white land, and such as abounds with hillocks, and that which is thin and sandy, and such as abounds with roots and coarse weeds, which you did not work^h in the month of October. You must turn up brackish earth with small ploughs, and you must scatter over it some bean-halm; but if you do not do this, some wheat or barley straw.

II.—IN THE MONTH OF FEBRUARY.

In the month of February we are to transplant vines that are well rooted from the nursery, two
or

^f Thus called from its lying on the ground.

^g Observing serene days and hours (in the Greek).

^h Renovate, in the Greek idiom.

or three years old, but by no means those of a year old, for they are too weak. The transplanting of vines produces much fruit, and it makes the wine good. In this month we plant the reeds before they begin to bud. In this month it is also expedient to plant the vine and all kinds of trees, and roses, and lilies¹, when the moon is increasing. In the same month we are to sow trimestrian² wheat, and sesamum¹, and hemp; and the land in which we are to sow medica³, we must now plough a second time.

III.

¹ *Tanquer*. It is not impossible but the Greeks distinguished them by this name on account of their superior size and beauty, and because the organs, by which botanists form their arrangement into classes, are so perfect and discernible in them. The French call this plant *le lis*; and contrary to the customary mode of elocution in use among them, that they may give force to the word, they give the last letter its due sound. The word is of Gallic origin, and the Franks thought proper to retain it among an incalculable number of words, which remain to this day in the French language. Its import in the earlier ages of Gaul conveyed distinction of a superior kind, and it was expressed with little variation from what I have already mentioned, signifying, by way of eminence, *the plant*.

² So called because it came to full growth in three months.

¹ In English, the oily grain.

³ Lucerne.

III.—IN THE MONTH OF MARCH.

IN the month of March, we are to select shoots for grafting, and we are to graft vines and other trees. In this month we must plant reeds before the equinox. In this month we are to take care of the olive trees that want assistanceⁿ. In this month we are to lay hogs dung to the roots of the almond trees, for it makes those^e that are of a bitter taste, sweet, and larger, and delicate, as Aristotle says. Theophrastus indeed says that you are to pour urine over their roots. This month we are to plant all kinds of trees from truncheons, especially in cooler and more wet situations. This month we ought to dig round the roots of the vines and other trees, for such as are then dug bear abundantly, and good fruit. This month it is proper to remove the buds of the vines that are three years old, as the buds are yet tender. Some indeed remove the buds with their hands; for it is an opinion of the ancients, that you are not to apply an iron instrument to the vines before they are three years old. The laying down also of vines three years old, is more convenient

ⁿ Healing, according to the Greek.

^e This word alludes to the fruit of the almond trees.

venient in this month. The persons that graft in this month, ought to do it before the trees bud, when they seem to have a greater share of moisture, and to be careful that the shoots taken for grafting of apples and pears may be taken off with a very sharp knife, with caution and exactness; for the bark of these trees is tender, therefore some remove them with their hands rather than cut them with the pruning-knife. Persons that prepare the ground for seed, ought also to plough it, that it may be refreshed, for being then turned it will not cherish many weeds, and it will become more friable. It is not sufficient to do this once, but it must be done a second and a third time. It is proper indeed to sow the white wheat denominated *sitanion*^p, and the black wheat, and the oblong called the Alexandrian wheat, in light land, and well exposed to the sun, and in elevated ground, and in such as is accomodated with trenches, and in sandy and dry land, to the day before the ninth of the calends of April. You are to sow what is called the small barley, in land that has produced a crop of wheat. You are to sow sesasum,

H 4

typha,

^p Galen says this was trimestrian wheat. See Theop. *de plantis*, l. viii. c. 2; and Dioscorides, l. ii. c. 107.

typha¹, spelt, millet and hemp, in situations near the house. When the things that are sown run to stem, weed them, for then the produce will be clean and exuberant. Cut your green cytissus also.

IV.—IN THE MONTH OF APRIL.

IN the month of April, olives may still be planted, and it is particularly proper to dress² them at this time, for when they are thoroughly dressed they produce better fruit. Theophrastus indeed says that cuttings of olives and of pomegranates and myrtles may be planted this month in wet and irrigated situations. This month we are to graft and to inoculate olives and other trees in good time. At this season also the fig, and the chesnut, and the cherry, begin to be inoculated³. But the second digging of young vines ought to be completed this month; and it is also proper to prune the new vines, for the incision that

¹ A reed that is common in Italy. The Tuscans call it *mazza sorda*; for they are of opinion that, if the *lanugo* which it produces falls into the ears, it makes a person deaf. The Spanish name of this plant is *Bokordo*.

² Καθαίρει signifies here, to remove the useless ^{roots}.

³ Ενοπιδιμύζωδαι.

that is now made will be smoother; although it is the opinion of some, and especially of all the ancients, that you are not to apply the knife to the vine before three years. This month it is proper to gather the seed of the elm[†], and to sow it immediately. The fig trees also which have good roots may be transplanted, although they are now shooting.

V.—IN THE MONTH OF MAY.

IN the month of May it seems to be most exceedingly proper to graft the vine before it buds. Some graft it after the vintage. This month we are to dress the olive trees; in the same month we are to rack our wines into other vessels; and it is proper to fill the jars within a little distance of the neck, that it may not burst, but that it may have vent[‡]. This month, as it has been already said, the vine may be grafted, even when the stem begins to shoot, for there is a viscous gum; but having taken the grafts a considerable time before they budded, and having carefully laid them under-ground, or in an earthen vessel,

we

[†] The witch elm is propagated from seed about this season.

[‡] The metaphor in the original is thus expressed: "that it may not be suffocated, but that it may have respiration."

we are to preserve them so that they may not germinate. This month it is proper to dig the vines, and especially when there is a drought; for digging animates the thirsty vine, for it makes it perspire, and the earth being laid on the roots refreshes the parching tree. It is likewise necessary to dig the nurseries. The nurseries are the plantations from which we take our plants, and transplant them into other places after two or three years. This month it is proper to irrigate the trees that are grafted, every evening, with water from a sponge. Some persons also plant trees this month in exposed situations, and in such as are very cold and very wet, or in such as may be irrigated; and they do this not only during all the month, but to the ides of June also; as it is manifest that every plant, before it swells into a bud, is to be taken for cultivation, for nothing that has once budded will have the power to shoot, except the fig only; although some plant vines after they have budded. This month also it is proper to dig lupines that have been sown for the sake of manuring or meliorating the ground; then to cut them before the ides, before the grape blossoms, when they are wet; and to suffer them, when cut, to rot, and afterwards to plough them, until the lupines that are cut are buried; and thus all the roots are destroyed.

stroyed. The same month also we are to turn the ground that is infested with much *agrostis*^u and we are to suffer all the *agrostis* that is eradicated to dry; and when the moon is sixteen days old, we are to carry it all in parcels out of the ground, and what is termed antipathy prevents the possibility of its reviving. It is proper also to rub and clean the vessels into which the wine is racked from the casks, with *spartum*^v, for there will be neither much defecation, nor will it dry, if there is, which is consummately hurtful to wines.

VI.—IN THE MONTH OF JUNE.

IN the month of June it is right to dig round the vines that have been grafted, before the ides, if it be possible, a second and a third time, having begun before the ides of May. Let all the pampination be also finished this month. We are now likewise to remove the prominent shoots; and if there be any excrescence in

^u See Book ii. c 6.

^v A kind of broom, the various uses of which Pliny mentions, lib. 19. c. 2. It is specifically distinguished from the Broom, or Genista, and it has a specific name in Spanish and Italian, *i. e.* *Spartio* and *Spartea*.

in the upper parts, for it is thought that one shoot is sufficient on a young vine. This month you must prune the hanging branches of the arbustive vines, that are come to perfection, and such as have no fruit. This month we are to apply the unripe figs, and the fruit of the wild^x sort, to fig trees. This month we are to graft and to inoculate all kinds of trees to the ides of the month of July, and the fig afterwards. The same month also it is proper to cover the trees that are dug around and left unfinished. Before the ides also we may dig round the reed and willow plantations: and it is the season to plant parsley, and amaranthus, and althea^y, in gardens. The same month likewise we are to cut vetches and hay, and we are to dry them in the shade, for thus they will be sweet; and after mowing we are immediately to water, and to plough the place anew. From the day before the ninth of the calends of July you are to begin threshing, for neither showers nor dew fall on these days.

VII.

^x This curious mode of fructifying fig trees was called by the Romans *caprificatio*.

^y Matth. iii. 146.

VII.—PREPARATION OF ALICA.*

LET the spelt be decorticated and cleaned, and put into boiling water, and let it be pressed : you are then to pound and sift some white gypsum very fine, and a fourth part of very white and very fine sand is to be gradually mixed with the gypsum and sprinkled over the spelt. Let it be prepared in the dog-days, that it may not get sour. When it has been all pounded, let it be sifted through a clover sieve. The alica that was first sifted is the best ; the second is that which comes after ; and the third is the worst.

VIII.—PREPARATION OF TRAGUM.

WHAT is called Alexandrian wheat must be irrigated and decorticated, and dried in a warm sun ; you must afterwards do this again, until the pellicles of the wheat and what is feculent^a fall off. In the same way also the tragus from the generous olyra^b must be dried and kept.

IX.

^a Χονδρος.

^b To *ωαδ* ; literally, what is fibrous.

^c Rye. In Spanish it is called *centeno*, because the Spaniards say it yields in the proportion of a hundred to one. There is a species of this grain, and it is probably what is here mentioned, which the French call *seigle blanc*, Amel corn, or French rice.

IX.—PREPARATION OF PTISANE.

BARLEY mixed with water is decorticated, and it is dried in the sun, and it is thus laid up. The light particles are sprinkled over it, for they make it keep. Let the proportion of water be as a tenth part of the barley. It is also wrought with salt that is not pounded, sprinkled over it. Ptisane^c is also made in the same manner from wheat.

X.—IN THE MONTH OF JULY.

IN the month of July it is proper to dig the vineyards to the second^d hour, and in the evening, till twilight, not to any great depth; and you must take up the weeds, especially the agrostis. You ought also to level the ground that has been broken, and to make it uniform, that the sun may not affect what is under ground. You ought likewise to dig round the vines that are come to perfection, for the pulverized soil matures

^c The French use *tisane*, which signifies barley water. The Gauls used the same word, but in their language it had a signification more analogous to the Ptisane of the Greeks and Romans.

^d i. e. to eight o'clock.

tures and enlarges the grape. This month it is requisite to destroy all weeds and thorns. This month also you may fell trees, if necessity compels, when the moon is decreasing, and when it is under the earth. It is still moreover proper to plough the ground from which beans or vetches* have been cut; for you ought immediately to plough all the ground after the harvest, before it becomes dry. It is moreover useful to cut and to lay up leaves for fodder for the cattle. About the ides of the same month also, you are to eradicate fern and butomus, and the rush, and the common reed: and having pounded some flowering lupines with hemlock, you will pour them over the remaining parts of the roots that are left in the ground, for they will cause them to wither. If the ground indeed abounds with many roots, sow lupines in it; and having cut them when in blossom, plough them in, so that they may be buried; and having scattered a little manure over them, let them remain; and after twelve days plough them twice, and sow such things as are suitable to the ground, having mixed a small portion of lentils with the seed.

XI.

* The Greek expresses chicheling vetches.

XI.—IN THE MONTH OF AUGUST.

IN the month of August it is proper to gather the grapes that are ripe in warm situations, and to dig moderately round those that are not yet ripe, and round the trees in the olive plantations in the same manner; and to break the clods so as to raise the dust, for this falling on the fruit ripens it the sooner; and on this account the olives and vines near the highway bear more valuable fruit, because of the dust raised by travellers: these indeed want no digging, as well as those that are in a thin soil, the earth being dried, for they are immediately parched, having their roots near the surface, on account of the tenuity of the soil. This month you ought to irrigate the grafts with water from a sponge, when the sun sets. This month you must dry your casks in the sun, and you must pitch them twenty days before they are to receive the wine. This month you are to remove the useless shoots of the late vine, for this pampination will cause the fruit to increase in size, and it makes it better, and it ripens the sooner. In young and fruitful vines indeed, you must take away some of the fruit,

^f On, in the Greek.

fruit, lest the more slender-bearing shoots and the fruit become useless. You must also gather the grapes for keeping, when they are come to maturity. It is the season also to take the figs that are dry in warm situations, and to prepare the trenches in which we are to plant olives, or any other trees in autumn. This month we are to water the meadow grounds that have been used to be watered ; and we are to cut a second time fern, and rushes, and reeds, and the butomus. We are to break up ground that is stiff, and heavy and rich, and we are to work land that is hilly and exposed, and such as is totally shaded, and toward the north, with deep ploughs, or with spades. We are to work out our corn to the day before the ninth of the calends of September, for neither showers nor dew fall during these days.

XII.—IN THE MONTH OF SEPTEMBER.

IN the month of September you must mark the fruitful and unfruitful vines, that we^s may cut off the latter, and that we may graft the former ; and let the marking be uniform with oil and pitch

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mixed.

* The transition as in the Greek.

mixed. In this month you are to insolate the chaff and the leaves of plane trees, in which we are to keep the grapes. Now it is also proper to gather nuts, and to lay them up when they are dry. To sow indeed to the day before the sixth of the calends of October is attended with uncertainty, for if a drought ensues, the seeds perish; but from the day before the fifth of the calends of October you are to sow lupines, for they do not want rain. After the ides of September, when showers have fallen before it is manured, it is proper immediately to plough and to manure thin land, and such as is full of roots and of gross weeds.

XIII.—IN THE MONTH OF OCTOBER.

IN the month of October also it is proper to gather the vintage; for the fruit that is first gathered makes most wine, but that which is gathered afterwards makes better wine, and what is gathered the third time makes that which is sweeter. This month indeed, after the equinox and the first showers, some plant to the setting of the Pleiades, and they begin to set about^b the seventh of the month of November. The same month

^b As from, according to the Greek.

month it is of utility to dig round the vines, and to apply to the roots a lixivium, or dust; or dry ashes, or stale urine, or the lees of wine, or chaff. This month you are to graft almonds, cherries, fig trees; and you may plant in nurseries¹ the olive, the almond, the cherry, and all fruit-bearing trees; and the elm, and the white poplar, and the ash, and the pine, and the fir; but the fig tree by no means at this season. It is also useful to sow the seeds of all trees. This month also we begin to prepare the green oil, having gathered the immature olives. The same month we are to cover the citron trees, which we have in wintry situations; but we are to cover their stems with the leaves of the gourd, and we are to throw the burnt ashes of gourds over their roots. It is better to begin pruning this month, and after the vintage to dig the ground, that what has been trodden by the vintagers, being loosened, may with facility receive the autumnal showers to the roots of the trees; but there will be less weeds when all the roots are cut and destroyed by the frost. The apples also, which are kept during the winter, ought to be gathered, and laid in the sawdust of odoriferous trees, and other fruits in

¹ In orchards, according to the original.

the same manner. The *asparagus palustris* is also to be now cleared of weeds. This month many begin their sowing; and if it rains after fourteen days, the seeds that are sown will be quite productive; and if it does not rain, the seeds will not be hurt. It is not however proper to sow before the calends of October: and you must observe the rising^k and setting of Corona; for the seeds that are sown on those days will be altogether productive.

XIV.—IN THE MONTH OF NOVEMBER.

IN the month of November we ought to plant vines, after the first showers, in warm and dry situations; and some persons prune them at that time in warm places; but the autumnal pruning universally improves the roots and the bearing shoots, and the vernal pruning produces a greater abundance of fruit.

XV.—IN THE MONTH OF DECEMBER.

IN the month of December the vine may also be planted. In November and December you
must

^k It began to rise on the third of the nones of October.

must clarify the sweet wine, after it has left off working, and you must wipe off the impurity and scum that are in the inside of the necks of the jars with fenugreek or with clean hands. In the months of December and November it is of utility to plant and to graft the suckers of all trees that blossom early, and to cut down timber for building, when the moon is at the extremity of its course, and under the earth. You must also dig round the young vines, and those that are come to perfection, and you must manure them that are come to perfection; but it is not necessary to apply manure to the young vines. It is likewise a proper time to prune the olives after the fruit is gathered, for a greater quantity of fruit is produced from the fresh shoots. It is also a seasonable time to dig round them and other trees, and to apply a sufficient quantity of goats dung or twenty *cotylæ*¹ of amurca to the trees that are weak. It is also a fit time to plant chesnuts, and it is a good time to set beans.

¹ A *cotyla* was half a pint + 2.141 sol. inches.

BOOK IV.

HYPOTHESIS.

These things are contained in this Book, which is indeed the Fourth, concerning the select precepts of Agriculture, and comprising what relates to the planting and culture of arbustive vines, and concerning the transplanting of them, and concerning the grape called *mursinitis*^m, and that which is called *theriaca*; and concerning the different methods of grafting; and how it is that the same bunch has different sorts of grape-stones; and concerning the keeping of grapes, and many other useful things.

I.—CONCERNING THE ARBUSTIVE VINES.

THE arbustive vines are more useful than all others, for they make better and more lasting^a and sweeter wine; and being placed at a good distance, they afford room for the ground that is between them to be sown after two years: and you ought not to set all kinds of trees for the arbustive

^a So called, because it was grafted on the myrtle.

^{i. e.} such as will keep.

arbutive vines, but such as have only one principal root, as the white poplar, or such as have contracted roots, and the leaves not immoderately thick, that they may not totally shade the vine; and they are such as these, elms, black poplars, ash trees, the maple. Let them be thirty or forty feet high; and there are in some parts of Bithynia trees that are sixty feet, on which the vine is spread; and they do not injure, but they make the wine better, and especially the Aminean. In a good soil then it is indeed proper to suffer such trees to grow as it has been already prescribed; but in a thin soil you must cut them to the height of eight feet, that all the strength of the ground may not be exhausted by the trees. Let the branches also be extended as much as may be to the east and west. You ought also to dig round these trees as you do round the vine, and to manure them moderately. It is also proper that the vines should be of a good length and strong, and they must particularly be planted with good roots; and some indeed, removing well-rooted plants from nurseries, set them; but others, clearing a flourishing vine, and taking it up with its roots with earth round them, lay it in a trench near the tree. Now a vine is set in this manner: plant it at the distance of three

cubits from the tree; when it has afterward taken root, that it may be united to the tree (and this is shewn from its thickness), having laid it down, and having laid some earth on it, join it to the tree, at the distance of a foot from the root of the tree, leaving the rest of the bearing-branch at liberty, and as many buds^o as can be left, which^p are to be removed with your nails and rendered ineffectual, that one or two shoots being left may grow with more vigour; and when this other part is grown, it is proper to apply it to the tree, that it may rest on it. You ought likewise to observe how that part of the tree may be carefully pruned, and that every thing about the root may be removed, that nothing may cover the root. It is also necessary to remember, that such vines, that is, such as are wedded to trees, are to be cut in the pruning to some distance, that the shoots are not to be left less than two cubits. It is also proper so to adjust the shoots on the branches of the tree, that the fruit-bearing parts may be exulted and moved by the wind. Let the ranks also have a distance of fifteen cubits, for thus the wine will be better and more abundant;

^o Eyes, according to the Greek.

^p “ Removing all which with your nail render blind,” in the Greek, well adapted to the original word *eyes*.

dant; and fruit-bearing trees with small roots may be set between, that is, pomegranates, apples, quince trees; and one may plant the olive at a distance, although this is not approved by some. Some also affirm that the fig tree is to be planted with vines, which experience has taught to be improper: it is therefore better to plant fig trees around at some distance. We have indeed known the arbustive vine in Bithynia to delight in the cherry tree, and especially the autumnal¹ vine; and indeed the Aminean, for it is productive of much fruit and of much wine: and one may sow this ground after two years, as it has been already mentioned; for men of experience affirm that it will not only not be injured by this sowing, but they announce² that the wine will on this account be better. Since indeed it happens that the vine, lying around the trunk of the tree, and thus ascending to the top, becomes in some measure, in process of time, straitened and suffocated by its union with the trunk; many persons in Bithynia place a wedge between the vine and the tree, and having thus separated the vine from the tree, they give it room, that it may be relieved.

II.

¹ Which ripened early.

² As in the Greek.

II.—ANOTHER,* CONCERNING THE ARBUSTIVE VINES.

Fix three goats horns erect around the arbustive vine, with the pointed parts downward, and the others upward, and cover them with earth, that a small portion of the horns may remain out of the ground, that the rain falling may irrigate the horns, and the vine will be very fruitful.

III.—HOW ROOTED VINES MAY BE EASILY AND SPEEDILY TRANSPLANTED.

WHEN we begin to ablaqueate, that is, to dig round large vines once and a second time, there will be great advantage from much diligence. From a vine then that is come to perfection, that is, from the tenth year and upward, having selected a very long and a very generous shoot[†] from the inferior part, that is, to the height of a foot from the ground; having set it, cover it in a trench dug a foot deep, and of such a depth as to receive four eyes, for it is proper that so many should be covered with mould, but in such a manner

* Chapter is implied.

† *Καύμα*, a cutting.

manner that, after digging in the four buds, they ~~that~~ are at the upper extremity and above the ground may not be more than two or three eyes. If indeed the shoot is larger, so as to be sufficient for a second trench, you are to make two quicksets from one, in the same manner, and according to the symmetry prescribed; and you are to dig in the second part of the shoot; but you ought to take off the remaining shoot, after laying the two, from which two rooted vines grow, as being for the greatest part useless. You ought also to observe and carefully to beware, that it may not shoot between the old vine and the part that is dug in; for it happens that two or three buds shooting between prevent the shoot that is laid from taking root: you ought therefore, when you observe this, to take off the buds with your nails so as not to permit them to shoot; and if new ones arise, you ought also to remove them. When there are indeed two or three eyes, which we have prescribed proper to be left at the extremity of the layer, for they give it that name, it is right to leave the best bud of one eye only, and to fix a slender stick or reed to the bud that is left, that the tender shoot may rest on the reed, and that it may not grow crooked nor straggle. The roots indeed become stronger when the shoot

is

is cut the second year from the vine, that the plant remaining too long; and drawing the strength of the parent tree to itself, may not hurt it: but the inhabitants of Bithynia, at the completion of the year, having made an incision only in the shoot already mentioned, do not separate the plant from the mother stock, which has not yet taken root, nor do they suffer it to encumber the mother stock, but they observe what is proper for both in the incision, cutting it off when it is perfect, and when it is time to transplant it, that is, at the beginning of the third year. Moreover, plants that are rooted and cherished in the nurseries seem to be the most useful, and especially the cuttings that are set as truncheons and afterwards transplanted; for these may be easily raised without disturbing the parent stock, and they grow more speedily, and they become vines without much trouble.

IV.—CONCERNING THE MYRTLE-GRAPE.

THE myrtle-grape hath myrtle branches underneath; and the grape becomes myrtle-flavoured, if you graft shoots of the vine on the myrtle.

V.

V.—CONCERNING THE EARLY GRAPE.

IF you graft the black grape on the cherry, you will have the grape in the spring; for the vine will produce the grapes at the time the cherry produces its own fruit. The vine will also shoot speedily, if having mixed pounded nitre with water, and having reduced it to the consistence of honey, you bountifully smear the eyes immediately after pruning; for it will shoot after eight days. You will likewise make the grapes come early by scattering a sufficient quantity of grape-stones that are sweet, that is, that are not yet turned sour, over the plants; but you will do better if you apply the grape-stones already mentioned to the plant, when it is planted.

VI.—CONCERNING THE LATE GRAPE.

IT is proper to remove the bunches that first grow, for others will again spring up in the places; bestow likewise greater attention on the plant, and it will produce clusters a second time, and these, when ripe, will be late: take these clusters
also,

* The Greek word implies they were to be scattered over the roots of the plants.

also, and lay them in earthen vessels that are perforated underneath, and cover the upper part carefully, and tie the vessels to the vine, so that they may not be moved by the wind.

VII.—CONCERNING THE GRAPE WITHOUT KERNELS.

SOME raise the grape without kernels in this manner: they gently divide equally so much of the shoot that is to be planted, as they are to bury in the ground, and they take the pith out with a scraper; they then tie it with wet papyrus, and set it. But it is better if the whole of the shoot that is set in the ground, be set with a squill ^{thrown in} put into it, for the squill promotes its growth and union. Others indeed cut fruit-bearing vines, and they remove the pith of a fruit-bearing shoot with a scraper as deep as they can, not dividing the shoot, as it has been prescribed, but suffering it to remain united, and dissolving *opos** of Cyrenaica in water, and reducing it to the consistence of *sapa*†, they pour it in; and placing the shoots erect, they bind them to supporters, that the *opos* may

* *Laserpitium*.

† *Εψμα* means sometimes *sapa*, sometimes *caranum*. Pliny says it was boiled down to a third part, l. xiv. §.

may not be spilt; and they apply the opes every eighth day to the shoot, until it buds: you are also to do the same thing with regard to pomegranates* and cherries, if you wish to raise the fruit without seed.

VIII.—CONCERNING THE MEDICINAL AND CATHARTIC VINE.

It is well known that the vine called theriaca is applied in many cases, and particularly to the bite of serpents[†]. But we are now to say in what manner it is prepared: having divided the lower part of the vine which we are going to plant, to the depth of three or four fingers, and having taken out the pith, we pour the antidote into the shoot; having then bound the divided part with papyrus, we plant it: but they, who do it with greater care, also pour the preparation over the roots. We likewise prepare the cathartic vine in this manner: we divide the shoot and put hellebore into it. But it is proper to know that the shoot of the theriaca left for planting, hath
not

* *Karyas* seems to be introduced for *peias*, by mistake, in the original.

† Venomous beasts of the creeping kind.

not the same power; for, when transplanted or grafted, it becomes languid, the preparation transpiring in time. Moreover it is proper to apply the preparation to the roots at certain intervals. The wine being drunk is of service against the bite of serpents, and the vinegar made of it, and the grape, and the dried grapes when eaten; and when these are wanting, the leaves of the vine pounded and laid on. When all these are deficient, the ashes of the shoots of the theriaca, when burnt, being applied, will save the patient: but besides the theriaca, the shoot of any vine is of service against the bite of a dog, but not when he is mad. Florentinus mentions these things in the first and second book of his Georgics.

IX.—CONCERNING THE SWEET-SCENTED GRAPE.

IF you wish to fill a place with sweet scent, having divided the shoots that are planted, inject some unguent^y into them, as it has been prescribed; but you will act more judiciously, if you irrigate the branches when wet with the unguent, and so graft or plant them.

X.

^y *Mugor.*

X.—THAT WASPS MAY NOT TOUCH VINES OR GRAPES, OR OTHER FRUITS.

SIP some oil, and using respiration sprinkle it over the vines, and over grapes and other fruits.

XI.—HOW GRAPES REMAIN ON THE VINE IN PERFECTION TILL THE SPRING.

HAVING dug a trench to the depth of two cubits near the vines in a very shady situation, and having thrown in a quantity of sand, fix some sticks, and bending the branches, turn them once or twice, moving them carefully with the bunches; and disengaging them from their supporter, cover them, that the clusters may not be wetted nor touch the bottom.

XII.—CONCERNING THE GRAFTING OF VINES.

THE person that grafts a vine must choose a thick stem, which is able to support one or two bearing shoots. Some indeed graft it in the earth, descending to the depth of half a foot, and they make the insertion almost at the bottom of the vine; and some graft it in the part even with

the soil, which is the best method: but that which is grafted high coalesces with difficulty, being agitated by the wind. But if it is necessary to graft high because there is no smooth place below, having prepared a supporter, the what is grafted high to it on account of the wind. Some likewise graft² it toward its upper extremities. If you also graft the vine on the cherry, you will have very early grapes; for at the season in which the cherry-tree has been accustomed to produce its own fruit, it will at the same period afford grapes, that is, in the spring. But the time of grafting is in the spring, when the frosts have totally ceased, when the vine being cut emits not much moisture nor water, but a thick and glutinous substance. You must select the shoots for grafting, round, solid, having many eyes, and chiefly from the bearing branches. Two or three eyes are sufficient in a shoot; but if it is set in the earth, three or four. It is not right to cut from one shoot above two grafts for insertion; for that part which is behind the seven first eyes is sterile and useless: but fresh shoots having a part of the former year's shoot will

coalesce

² The expression, according to the Greek, is "graft its shoulders."

coalesce more firmly. We are not to insert the shoots immediately after they are taken from the vine; but having covered the cuttings, and having laid them in a vessel, that they may not transpire^a, we are to insert them when covered before they begin to bud. Such shoots indeed then will be inserted more firmly in the earth at the bottom of the vine, the mould affording aid to their nourishment; but they will produce fruit later, as other shoots planted in the ground; and such as are inserted in a higher situation will coalesce with difficulty being agitated with the wind, but they will produce fruit at a more early period. The shoots then inserted high ought to be smooth and even, of the thickness of a man's thumb; and it is of use to cut with a sharp pruning-knife the roughness left by the saw. The inserted shoot also ought to be trimmed to the length of an inch or two on one side, as we see the reeds with which we write prepared^b; so that the pith may appear unhurt on one side; and the bark on the other; and the shoot is to be fixed to the extremity of the part that is trimmed, so that the intermediate space between the mother stock and the shoot may not be dis-

K 2

united

^a i. e. that the moisture may not evaporate.

^b Γλυφόμενος, carved.

united^c, and it must be filled with cement or with potters clay, for that will keep out the wet, and it will preserve its native moisture: the part also of the stock is to be tied at the incision with a band, single indeed, but strong; it is then proper to cover it with unctuous clay; some also mix cow-dung with the clay. The shoots being grafted, we irrigate the band with water from^d a sponge in the evening, in the middle of the summer; and when the germ is become four inches long, it is proper to fix supporters, and to tie it on account of the wind. When the germ indeed is grown, you are to cut the band with a pruning-knife, that it may be liberated from confinement, and that the moisture from the stock may be conveyed to the shoot. You must cut the shoots for grafting when the moon is in the wane, for thus the shoots that are grafted will be stronger. Some also graft not only in the spring, but likewise after the vintage, for the vine at that time has more inspissated moisture.

XIII.

^c Yawn, according to the Greek.

^d Through, according to the Greek idiom.

XIII.—CONCERNING GRAFTING BY TEREBRATION.

THE mode of grafting by terebration seems to me to be the best; for the engrafted vine does not remain useless in the intermediate time, but it likewise bears fruit, and the shoot, when it coalesces, will increase at the same time, the vine being by no means hurt from the operation of boring, nor by the constriction*. But the mode of grafting by terebration is performed in this manner: having bored the trunk of the vine with what is called the Gallic^f auger, and having drawn a branch of a bettermost vine, place it in the perforation, not cutting it from the old mother stock, and thus the shoot may live cherished by the mother plant, and fostered by, and coalescing with the vine that receives it; and within the space of two years the shoot that is introduced will be united with it. You must then, after the cicatrization, cut off the shoot which is

K 3

detained

* i. e. of the bandage.

^f The Gallic was thought to be an improvement on the Roman auger. It excavated without burning; there was less inconvenience from saw-dust, and it was esteemed better for grafting. See Pliny, lib. xvii. 25; Columella, iv. 29; and de Arboribus, cap. viii.

detained by its old mother plant, and saw off the stock of the engrafted vine above the terebration, and then the inserted shoot becomes the principal branch of the vine.

XIV.—THAT THE SAME CLUSTER MAY HAVE DIFFERENT GRAPE-STONES, THAT IS, GRAINS; SOME INDEED WHITE, AND OTHERS BLACK OR YELLOW.

You are to take different shoots of different kinds, and to divide them in the middle, but to take care that the slit does not come through the eyes, nor that any of the pith falls off; and you must apply and fasten^s the different kinds to each other so that the eyes coincide according to their places respectively, and that two eyes become united: you are to bind the shoots also fast in papyrus, and to cover them with squill or with very glutinous mould, and so to plant them, and after three or five days to water them until they shoot.

XV.—CONCERNING THE KEEPING OF GRAPES.

You must cut off the grapes gathered for laying up during the winter after the full moon, when

^s Glue, in the Greek.

when it is fine weather, about the fourth hour of the day, when the dew is dried up; and you must take care that all the grape-stones,^a that is, the grains, are sound; and you must also have a very sharp pruning-knife for this purpose, that it may be performed with ease and not with violence. You ought also to cut the grapes that are come to perfection, and not such as are sour, nor such as have past to a degenerate state. Some indeed then cut the bunches singly, and others cut small branches with the leaves, that is, separating the shoots with the bunches; they immediately cut off with scissars the putrid and dry and sour grape-stones, if there are any, that they may not infect those that are near them; and it is proper to smear the cut of the shoot of each cluster with melted pitch. You must then indeed spread the bunches on a pavement, each in a separate place, not touching each other, straw being spread under them, of lupines indeed if there is some, for this is more firm and more dry, and it has the power of keeping mice away: and if there is no halm of lupines, the next is the halm of beans, and of vetches, and of other pulse: and in respect of

κ 4

corn,

^a Τας πυρας. Παξ was the stone which covered the kernel or πυαγρον.

corn, barley straw is the most eligible; but if there is nothing of this kind, having cut some hay small, strew it under them. You must also spread the small branches with their leaves on a pavement, or you must hang them up: but some lay the bunches in iraion, that is, in saps, for a short time; but some lay them in small vessels that are pitched, with dried sawdust of the pine, or of the fir, or of the black poplar, or with the flower of millet: others having immersed the bunches in sea-water that is boiled, or, where the sea is not near, in brine with wine mixed with it, lay them on barley straw. Some also having boiled ashes of the fig, or of the vine, with water, and having besprinkled the bunches and dried them, lay them on the straw already mentioned. But grapes are kept a considerable time suspended in granaries, and especially if the corn is moved; for the dust arising from it resting on them, conduces not a little to their preservation. You are to preserve grapes also thus: having boiled rain water, so that a third part of it is left, having exposed it in the open air, that is, having cooled it, pour it into a vessel that is pitched; then taking the bunches of ripe grapes, having the grape-stones solid, having picked the immature and putrid from them, throw them in,

so that the water may cover the bunches; and having carefully set on the cover and secured it with gypsum, set them in a place that is cool and not exposed to the sun, where there is to be no fire burnt; and the water of these is found to be of a vinous quality, and of use to persons that are sick, and the bunches are preserved genuine. Some advise to hang the bunches in an upper chamber, having tied them, not from the upper end, whence the separation of the bunches is made, but from the part beneath, that they may perspire more freely, the grape stones being better exposed by the action of bending backward. It is also of use to suspend them in a cask of must, while the must neither touches them, nor they one another, for they keep as they were taken from the vine. You will also preserve the bunches, if immediately after the vintage you throw them unhurt and whole into a pitcher, and carefully stop the mouth of the pitcher and secure it with gypsum. Being also covered with potters clay, that is well wrought, so as to have the consistence of honey, and being suspended, they are preserved, and they are washed clean for use. They are preserved in the same manner, being rubbed with the juice of purslane, and hung up. Some pre-
serve

serve them in wine mixed with water. The grape keeps a whole year; if, having thrown warm water, having alum in it, over it, when gathered rather early, you instantly remove it. The grape is also preserved in honey. What has been said in relation to the grape, suits apples also.

BOOK V.

HYPOTHESIS.

These things are contained in this Book, being the Fifth of the select Precepts on Agriculture, and comprising the method of planting and raising the vine, and when it is proper to gather the fruit, and what relates to the keeping away of animals inimical to it; and what relates to the preparation of *Cenanthé*, and to the making of dried grapes; and what relates to the planting of reeds.

I.—CONCERNING LAND FIT FOR VINES.

LAND that is of a blackish colour, not dense, and having a moderate quantity of good^{*} water at some depth, is adapted to vines; for such land receiving the showers, neither wastes them by admitting them under ground, nor does it retain the water on its surface, for that which is retained on the surface rots the plants. One ought therefore to examine the soil to some depth, for we often find indeed what is of a
blackish

* Sweet, in the Greek.

blackish colour above, and a soil of potters clay underneath, and the reverse again. But land that is thrown up by flowing rivers, is the best; whence we commend Egypt. And to speak briefly, every soil of a blackish hue, not too dense nor too glutinous, but having moisture, is well adapted to receive the vine.

II.—THE KINDS OF VINES; IN WHAT SOIL YOU ARE TO PLANT THEM, AND WHAT POSITIONS ARE ADAPTED TO THE VINE.

You are to plant the white vines in the soil of blackish colour, and which is moist and watery, already mentioned; for these kinds want more nourishment from the soil, as they are of a firm texture, and dense, and they are raised with difficulty. A soil of potters clay likewise, unless it is altogether thin and broken into fissures, receives the white¹ vines: such vines however do not suit a dry, and thin, and sandy soil, but they which have thick grape-stones and little pith, as the black grape generally is, producing good, and much, and strong wine, being of a quality contrary to the white vines, which are naturally difficult

¹ i. e. vines bearing white grapes.

difficult to be raised. That called *Psithia*^a, and the *Corcyraean*, and what is denominated *Chloris*, being white, alone love a thin soil, because they are richer. For it is necessary to plant those which are indeed naturally more moist, in squalid and cold and more dry situations; but those that are dry, in moist situations; for thus what is wanting to the plants may be supplied from the nature of the soil. It is universally proper therefore to set the kinds of vines that are not easily nourished, but such as are of a contrary nature, in a more exuberant soil; and in a soil of blackish colour, such as are thriving and able to draw to themselves all their aliment from the earth: for those of prosperous growth set in rich ground do not accelerate the ripening of the fruit, but they run into a profusion of leaves; and those that are weak will produce fruit that is worse^b in drier situations. It is therefore necessary to form a judgment and a discrimination of the plants and of the soil, as it has been demonstrated, and thus to fix the temperament.* For this reason some transfer the plants from mountainous into champagne situations, and again from

^a This is mentioned by Columella, lib. iii. 2. 24.

^b Weaker, according to the Greek.

* *i. e.* mixture of different qualities.

from champagne situations into such as are mountainous, for they say that the earth loves a contrary affection. Of all the vines indeed that called *Mureites* is the best; for this is that which in Bithynia produces the wine called *Dendrogaleon*; in other regions again the *Tiarenor*²; and in Tios of Paphlagonia, the *Tianon*; and in *Heraclea*³ of Pontus it produces the most celebrated wine; and wherever this wine is planted, it will produce fruit greatly superior to that of all others; for its grape is very sweet and nocturnous when eaten, so that the bees also have recourse to it in quest of nourishment. It is indeed so very productive, that it bears clusters on all the stem, such as are round in their appearance; and the grape-stones are pellucid, and the kernels and the pellicles are even transparent; but it has the pedicels, which support the clusters, in general hard and ligneous. It delights also greatly in lofty trees, and it likes to be assiduously pampinated. But that wine is the best which is produced from vines planted in dry and inclined situations, and facing the east or the south. It is indeed more proper to plant the

² From Tiare, a town of Mysia.

³ On the shore of the Euxine Sea.

⁴ In the arbustum.

the arbustive vines in a champagne, and hollow, and even situation: but you are always to remember, and particularly to observe, that the land is certainly more adapted to a plantation of low vines, which is in irregular and gently-inclined situations, and in such as are more elevated and more dry, for this will receive the summer's heat with less intenseness, being well exposed to the air: and that which is expanded in tumulose situations, and at the bottoms of mountains, suits low and prostrate vines; for in such situations the soil from the top, and whatever is nutritious and of a fertilizing quality, is gradually conveyed downward imperceptibly by the descending showers. But you must not plant vines on the tops of mountains, for the wet conveyed from them with the soil, leaves the roots naked and without nourishment. But you ought to plant the arbustive vines in champagne and even and moist ground, and especially in warm situations, where the winds not being too powerful, but blowing moderately, cherish them suspended on the trees; but the winds being vehement in cold situations, hurt the arbustive vines. The *Theriaca* is undoubtedly the best of all for the sweetness of its wine, to which Democritus bears testimony with regard to salubrity and superior goodness; but it bears a shoot naturally slender and feeble.

III.—CONCERNING THE NURSERY.

THAT is called the nursery, in which plants are set to be transplanted, and, as the Bithynians say, where they are preparatively nursed. Let the plants be set in the nursery not less than a foot deep; for thus the plant will be easily dug up with the spade, and it will always be more benignly warmed by the sun: but let such as are called the anterior shoots, and what is of superfluous growth, be removed, that it may increase in thickness. It is also proper they should be removed with the hand, not with the knife, for the application of the knife makes the young vine become torpid. Some indeed transplant it the second or third year; but the sets that are transplanted the third year will be more generous. It is not proper to water the nurseries, unless we are also to water the vineyards; for every thing that is done in the nursery, must be also done in the vineyard.

IV.—CONCERNING CLIMATE¹.

WE ought always to adapt our plantation to the nature of the place. For if the situation is warm,

¹ i. e. the plant.

² According to the etymology of the Greek word, it seems to signify what is in English called *aspect*.

warm, we are to set our plants facing the north; and if it is cold, we are to set them toward the south; and if it is between these extremes and temperate, an eastern and western aspect will be more eligible: an eastern one will still be more so, if it be not infested by the south-east: and sometimes a western aspect will be rather preferable, when being at a distance from the sea it has the western breeze blowing towards it: and universally in more warm situations the northern winds are suitable, and in such as are cold the southern breezes.

V.—CONCERNING MARITIME SITUATIONS, AND
SUCH AS ARE NEAR RIVERS.

MARITIME situations are much adapted to the vine, both on account of their warmth, and on account of the moisture that imperceptibly rises from the sea to nourish the plants; and the sea breezes are very useful to the vines. It is the opinion of most persons that there ought to be no river near, much less a marsh, on account of the vapour and cold air that continually rise there: blights also arise, noxious to the vine and to the corn grounds, and rendering the air hurtful. You ought moreover carefully to avoid marshes as

much as possible. But it is proper to know that whatever vines have been used to be hurt by such winds, or by clouds, or blight, when raised on trees, that is, when become arbustive, they will not be hurt.

VI.—CONCERNING THE TIME OF PLANTING VINES.

SOME advise to take the shoots and immediately to plant them at the beginning of the spring, while the western breezes blow: and some advise not to plant immediately at the beginning of the spring, but they recommend to take the shoots and to plant them when the plants are going to bud. The seasons then indeed for planting vines are different; for some truly plant them after the vintage, when their leaves are falling, and some at the beginning of the spring. But I having received my knowledge from experience, advise rather to make every kind of plantation, and especially of the vine, in situations that are not irrigated, in autumn; for then the shoots, eased from their burden and from the weight of the bunches of grapes after the vintage, and having recovered their strength and power, and not yet

See Columella, 3. 14; Palladius, 3. 9. and 10. 4.

yet worsted by the frost, will more speedily coalesce with the soil, and nature particularly cherishes the roots more at that time. We ought therefore, as it has been observed, to plant in situations that are not watered, in autumn, that the showers that fall during the winter may supply the want of irrigation. I have done this in my Maratonyme villa (whence I am induced to date the origin of the thing), and in other places where I have possessions : and they indeed who saw and heard of what was done disapproved of it at the beginning ; but having afterwards received much advantage from the practice, they were pleased, and followed my doctrine ; and this holds good among us to the present time. This is however evident, that it is not proper to plant the vine after the vernal equinox.

VII.—IT IS PROPER PREVIOUSLY TO KNOW
WHAT KIND OF WINE THE GROUND TO BE
PLANTED, WILL YIELD.

I THINK it very necessary that the vintager should first of all know what kind of wine will be produced from the land that is to be planted ; and the experiment in relation to this is made in this manner : having dug a trench to the depth

of two feet in the ground that is to be planted, and having taken some mould from the spot that is dug, throw it into a glass vessel with some clean rain water; and having mixed and perturbed the water, suffer it to come to a perfect sediment, and it will then be quite visible to you through the transparent glass: and when it has perfectly subsided, taste the water; for as the taste of the water will be, expect that the wine will be also like it. If indeed you then find the savour disagreeable, or the taste bitter, or saltish, bituminous^u, or otherwise bad, decline the planting of that ground; but if you find it well flavoured, and pleasant, and sweet, and extremely good, plant that ground with confidence.

VIII.—WHAT SHOOTS OUGHT TO BE PLANTED, AND FROM WHAT PART OF THE VINE, AND WHETHER IT IS PROPER TO PLANT SHOOTS FROM YOUNG OR OLD VINES.

WHEN vines will produce fruit in perfection, you ought to have an eye to those that bear good fruit, and plentifully, and have many eyes and no blemish, and to mark them all, and to take the

^u Ασφαλτος, of the taste of asphaltos, which is a species of bitumen.

the plants from them in the season for planting ; not from young vines, for they are feeble ; nor from old ones, for they are barren ; but from such as are the most vigorous, or rather before they arrive at that period. But you are to take the shoots neither from the highest nor from the inferior parts, but from the middle of the vine ; and you are indeed to throw away a shoot that is rough, and extraordinarily wide, and hollow*, and that has few eyes, and the root end contracted ; and you must take the shoots that are round, and smooth, and solid, and having many eyes, and many fresh buds : and let the shoots that are taken, also have a part of the shoot of the former year ; and when taken, let them be immediately planted, for what is recently cut coalesces with the soil more speedily, as being quite alive : but if the planting is necessarily delayed a short time, it is proper to dig the shoots into the earth, as soon as they are taken, either loose, or remissly tied, that they may all be cherished* by the soil, which is to be neither too dry nor too moist ; and that is better, whence they were taken. If indeed it is necessary to keep the plants longer,

L 3

let

* *Αναθήμερις*, like *ferula*.

* Enjoy, in the Greek.

let them be put in a vessel^γ that is dry, some mould being previously spread under it, and some being also thrown into it, that they may have the benefit of the soil on all sides: but the vessel ought to be carefully stopped with clay, that neither the wind nor the air may be able to get in, for the plants thus keep unhurt during two months. Some indeed have kept shoots received from a great distance fresh^², having laid them in squills, or in edible bulbs. But plant such as are hurt by time and become dry, having put them in water during a night and a day; and if the ground is more than commonly dry, it is better to irrigate the shoots that are healthy, and so to plant them. It is proper also to take care that the shoots to be planted may not germinate before they are set, for they will die; but that part of a shoot is better for planting which extends to seven buds^³. The shoot then is good and fit for planting, from one that is of the former year, as far as seven buds; but otherwise it is useless. Wherefore some do not do well, who cut the shoots longer into two or three parts, and plant them.

IX.

^γ *Εν κιβω*, in a cask.

^² Green, in the Greek.

^³ Eyes, literally.

IX.—HOW VINES OUGHT TO BE PLANTED, AND WHAT OUGHT TO BE DONE, THAT THEY MAY SPEEDILY TAKE ROOT; AND WHETHER A SHOOT IS TO BE PLANTED STRAIGHT OR IN AN OBLIQUE POSITION.

THEY who plant a vine ought to remember always previously to apply moist cow-dung to the roots, and to the upper extremities of the shoots; for they say that reptiles and worms, when they smell it, do not get to them. It is also proper to scatter a small quantity of pounded mast of the oak, and vetches that are bruised and once ground, so that they may be only bruised and separated, to mix with the mast, and to scatter them over the places where the plants are to be set; for these contribute to the facility of their taking root, and to the keeping^b of the wine, and to produce plenty of fruit. Some also throw in with the plants the halm of pulse, and especially of beans, for such things keep them warm during the winter, and they prevent injury from noxious animals; and some pour in urine. It is also proper to throw in a handful of parched

L 4

grape-stones

^b Προς παλαιωσιν, to the age, i. e. to give it strength to enable it to keep.

grape-stones^c into each trench, the grape-stones of white grapes indeed to the black kinds, and of black grapes to those that are white. You may likewise plant your shoot straight; but that which is oblique is better, for the latter takes root sooner. Whether the plant is set straight or crooked, you must put three or four sizeable^d stones around; you must then throw in the mould with the dung, treading it level: it is likewise necessary to take care that the eyes near the soil may not be inefficacious; you must then lay on more stones of the same size, and tread them in. Manure indeed thrown in cherishes and strengthens the plant, and grape-stones make it take root sooner. The stones also prevent the mould from falling in altogether, and they keep the roots cool in the summer. Sotion also recommends to apply^e the least quantity of the pitch of cedar to the extremities of the roots of the plant; for it does not suffer it to rot, and by its smell it prevents reptiles from getting in. Some indeed then do not turn the ground, but simply use a setting stick, and set the plants: but this

^c The Greek strictly means the kernels contained in the stones.

^d One of which was a handful, according to the Greek.

^e The Greek implies that this application was in a moist state.

This is very disagreeable to me, for the mode of planting, with a thorough digging, is better than the planting by means of the setting stick; for in the latter case indeed the eyes are injured^f, and the shoot is distorted, but in the former it is set straight and unhurt.

X.—WHAT DAY OF THE MOON, AND WHETHER WHEN IT IS ABOVE OR BELOW THE EARTH, IT IS PROPER TO PLANT VINES.

MANY of the ancients positively affirm that you are to plant vines from the first till the fourth day of the moon's age; and some advise to plant them on all the days while it increases, and to prune them when it decreases. Others decline planting when it increases; but this is acknowledged, that it is of utility to set vines when the moon is under the horizon; and to cut wood likewise when it is under the horizon. But Sotion says, that it is right to plant vines on the days when the moon is invisible, that is, on the first and second day; and other trees before the moon becomes apparent to the human race, for he says, that such things as are planted on these days all take root; but I have often planted when the
moon

^f Blinded, in the Greek.

moon was decreasing, and I have not repented. Sotion reckons the twenty-ninth and thirtieth among the days of the moon's invisibility. It is proper to take the shoots for planting and for grafting when the moon is decreasing.

XI.—WHAT MAY BE RAISED IN VINEYARDS.

SOME plant beans and vetches[§] in their vineyards, as having the power to preserve the plants unhurt; and some indeed sow gourds and cucumbers: but experience has taught me that it is useful to sow nothing in the vineyards; for the things that are sown take away the nourishment from the vines, and the shade is hurtful to them. Avoid most particularly the cabbage as naturally dry, and having a native antipathy to the vine. It is well known that if any one pour the least quantity of wine over cabbage while it is boiling, it will not boil to perfection, and its colour will be spoiled. Persons also wishing to drink much wine and not to be inebriated, previously eat raw cabbage. If it also happens that the vine and cabbage are planted the one near the other, the vine while growing, when the cabbage approaches, does not make a straight progression, but it be-
comes

§ A vetch of this species was called *ορεῖος*.

comes distorted, having an antipathy to the cabbage. Tarentinus also says that you are to sow nothing at all between the vines, which I likewise recommend, having experience for my teacher.

XII.—CONCERNING THE DEPTH OF PLANTING VINES.

It seems to me not to be right to make the trenches for vines less than four feet in depth; for those that are planted on the surface soon grow old, and they produce poor fruit, receiving little nourishment in a scanty soil, and they are scorched in the summer. But it is necessary to dig and to plant as deep as the heat of the sun penetrates; and they affirm that the heat of the sun does not descend further than the depth already mentioned, unless the ground has fissures; but if you plant to a less depth than what has been prescribed, you will have vines that will be useless, and they will soon grow old. Be persuaded then that a depth of four feet is nutritious, but that which is lower is sterile; but a plantation made to the depth of three feet is not bad.

XIII.

XIII.—WHETHER IT IS NECESSARY TO PLANT TWO SHOOTS, OR ONLY ONE, IN A TRENCH.

It seems to me to be necessary to set two shoots together instead of one in vineyards; for, if one fail, the other will live: but perhaps it may not be proper to set two shoots in nurseries where there are so many shoots already set. It is however certainly right to set two, that we may leave that which is most thriving. When two shoots indeed are planted in vineyards and become strong, that which is the weakest is undoubtedly to be taken up; and that which is left is to be tied to stakes, which is to be suffered to remain in its place, or to be transplanted; for if two shoots are permitted to be in one trench, their roots are confined, and they do not partake of sufficient nourishment, as two infants are not fostered by one nurse.

XIV.—CONCERNING THE DIFFERENCE OF QUICKSETS^a, AND OF THOSE RAISED FROM CUTTINGS.

THE rooted plants of vines seem to differ from cuttings in this, that the rooted plants have an acknowledged

^a Καὶ τῶν ἀπὸ κλημάτων; literally, “and of those raised from a cutting.” Κλημα was a cutting, which was set in the ground

acknowledged growth, having once taken root, and the latter are in expectation of taking root. The rooted plants also indeed produce fruit the second year or even sooner; and those from cuttings hardly the third or fourth year: but transplanting makes the fruit better. Some do not act properly that cut the longer shoots into two or three parts, and plant them; for that part from one to seven eyes is only useful, but the part above is of no use, according to the opinion of Florentinus and of the Quintilii.

XV.—THAT IT IS NOT PROPER TO PLANT MIXT KINDS OF VINES, AND ESPECIALLY THE WHITE WITH THE BLACK GRAPES.

EVERY vine is not of the same nature nor of the same season; but one indeed brings fruit to perfection soon, and another late. The fruit is also different; for some is yellow, some is black, and

to grow. The Latin word *sarmentum* is not well applied to convey the meaning of the Greek term with perspicuity, although it is so constantly used in the translation. The Greeks called the shoot, which they used as a graft, *σπικη*, which the Romans called *surculus*.

¹ This and the preceding sentence are inverted in this translation, for they seem to be misplaced in the original.

and some is white: some is indeed sweet, and some is bitter, and some is indeed light, and some is heavy, and some is durable, and some is not so: and some wine indeed is better when it is old, and some when immediately drunk; and the nature and management of each is different. You ought then to avoid the mixing of these, lest the best being mixed may be hurt by the worst. But nothing hurts wine so much as when the early grapes are gathered with those that are later; but that is to be accurately observed above all things, that the white may not be trodden with the black grapes; and it will be much better if they are not planted together, for they have a certain natural antipathy to each other.

XVI.—THAT IT IS BETTER NOT TO PLANT VINES OF THE SAME SORT, BUT THE DIFFERENT KINDS APART.

THEY do most prudently who plant three or four kinds of vines apart in the vineyard; for they will all prove productive together, or they will not all prove defective together, for it is precarious to depend on one kind: for this reason then it is not proper to plant promiscuously, but separately, according to the different kinds; for
there

there is a very great difference in wines, not only in respect of colour, but in respect of quality likewise; and the wine that is made from the different vines has a consummate difference.

XVII.—CONCERNING THE DIFFERENCE OF KIND IN VINES.

EVERY vine indeed does not produce the same wine in every situation; for the quality of the air also contributes greatly to its goodness, and on the contrary it is hurtful to it. The Aminean, however, in general produces wine of a more excellent kind in every situation, and particularly in oblique and dry situations, and in such as are wet, and especially if it is raised on trees. The vine also which is next the Aminean, which has small clusters of grapes and many grape-stones, which is called by the Bithynians *Drosallis*^{*}, which some also gather with the Aminean, produces likewise sweet wine. The white wine also, which has larger clusters, raised on trees in dry situations, produces very good wine, and plenty of it, and it is called in Bithynia *Leucothracia*; and it has oblong clusters, and the grape-stones of equal thickness, globular, and of a beautiful appearance;

^{*} In some copies it is *δρυσάλις*.

ance; and in the season when they are ripe, of a deep red colour; and it has its shoots also red.¹ There is also a vine in Bithynia called *Bosine*, which comes to maturity soon; and it is quite early, bearing large clusters, almost a cubit long, and grape-stones that are full and of a white colour, transparent, and round, having the appendant clusters immoderately long; and what is peculiar to this alone, it throws out three shoots from every eye, while the other kinds hardly produce two from an eye; it is therefore expedient to cut it quite close in the pruning of it, lest it soon become languid, as it is a great bearer. This vine is also enormously large, and it does not soon grow old, nor is it hurt by the circumambient air, and it bears the various kinds of air; it also makes wine that is sufficiently good, perhaps on account of being raised on trees; but it is not durable, from the nature of it. The Aminean also already mentioned is not less fruitful than these: it is therefore eminently proper to prefer this to all; for Varro affirms that every plethron

¹ Σφοδρά σμυτομήν. Σμυς is what the French call *camard*. The Romans, by adding a letter, formed a word by which they signified a monkey, from the flatness of the most leading feature in the animal's visage, Σμυτομήν signifies to cut flat and even.

plethron^m of Aminean vines used to produce three hundred amphoræ. But one may leave many shoots of this vine to make a more abundant quantity of wine; for it likes to be cut to a great length in pruning, and to be allowed many shoots. You ought therefore to plant the Aminean vine principally in every situation; and if the planting of other vines has pre-occupied the ground, you may graft it; for the grafting of it is not less useful than the planting, and especially if the vine that is grafted is laid down the second year. We however prove it to be fruitful, not from the first and second year, but from many years; for the men that prune, having often left many shoots, are the cause of an ample produce of wine for one or two years. But that vine is fruitful which, having a moderate number of shoots left, always bears in the same manner. That then is to be universally reckoned fruitful, not one which bears one cluster on each shoot, but many shoots from each eye, and clusters from each of them.

^m Plethron, in this place, evidently signifies what the Romans called *jugerum*. See Varro, i. 2, 7.

XVIII.—HOW ONE OUGHT TO PLANT A LAYER.

WE are to plant the shoot called a *layer*^a in this manner: having dug a trench a foot deep, and having drawn the shoot from the vine, not cutting but bending it, we set it in the trench, and we lay some mould on it, leaving a conspicuous part of the shoot to remain above the ground, that the one part, being still joined to the vine, may draw nourishment as from a nurse^b, while the other is fostered in the soil, and it takes root being doubly cherished^c. The shoots indeed thus planted produce fruit without difficulty; and they will be well nourished which are raised from maternal and from their own roots, which are properly transplanted, when they are three years old.

XIX.—CONCERNING THE MODE OF CULTURE.

THE ground to be planted is to be cleared from all wood, not only by digging, but also by often ploughing; not only by taking up the roots, but also

^a Την καλυμμένη απευρύα.

^b Ωσπερ απὸ μαστῆ; as from an udder.

^c Being nursed by two mothers, in the Greek.

also by carrying away the stones, and especially such as are large; for all the stones that are above burn the stems during the summer, being warmed by the sun, on account of the heat remaining in the solid substance; and the stones being again cold during the winter, and especially the small ones which are about the roots, hurt them; as, on the contrary, they that are deep are an advantage, for they refresh the roots in the hot season. The ground indeed ought to be dug so that the part which is above may get to some depth, and that the soil below may be raised to the surface; for thus that which is dry has the benefit of the moisture above, and that which is wet and dense will have the advantage of warmth and of solution. But we ought to take care that we may level the cavities as much as possible, and that we may not suffer hollow places to be in the vineyards. When one digs round the vines after they have taken root the first year, he must remove the roots near the surface with a very sharp knife the following year; for a vine, that has been accustomed to spread its roots on all sides, precludes a deep radication.

XX.—CONCERNING ABLAQUEATION.

WE are indeed to ablaqueate, that is, we are to dig round vines when they are two years old to the depth of two feet, to the breadth of three; and among the arbustive vines we are to cut off the creeping roots of the trees; for, as the plants of the vines being yet tender, if they meet with larger and more powerful roots, they are oppressed and disturbed: therefore there ought to be a good distance between the plants of the vines and the trees.

XXI.—CONCERNING THE CARE OF VINES.

It is proper to cut off what is redundant in vines just planted, not in a transverse section, nor near the eye, but more than two fingers breadth distant, not to the north but to the south, the incision being made behind the eye, that the sap that flows down from it may not hurt the eye underneath: and if the moisture be troublesome, smear the cut with fresh amurca that has been boiled; and you are to ablaqueate the plants twice or three times, and some throw manure over them. You are to dig round them the second year every
six

six months: and when they begin to be three years old you must carefully remove what is superfluous with a saw, and after the autumn you must dung them a foot deep. But we are to ablaqueate vines in wet situations, and we are to leave the roots near the surface, that, since on account of the abundant moisture the inundated roots cannot remain deep, they may at least spread sideways and be able to live, not having the benefit of soil to much depth, but saving it above from extension in breadth.

XXII.—HOW MANY SHOOTS IT IS PROPER TO LEAVE TO A VINE FOUR YEARS OLD, AND TO WHAT SORT OF STAKES YOU ARE TO TIE THEM.

It is sufficient to nourish two shoots on young vines the fourth year, to which more than four eyes are unnecessary, and we may indeed remove those two near the stem with the pruning-knife, and to prevent them from budding; but we must leave the two uppermost for the increase of the plant. But at the beginning of the spring the pruner must fix a strong and straight stake from five to seven feet; and let it not be more slender than a very generous reed, that it may not encumber nor shade the plant. A stake indeed

that has no bark on it is more eligible, for cantharides and such things as have been used to infest the vine get into a stake that has the bark on, and they are concealed in it. You must also tie the plant, having stretched it to the stake. When a vine is likewise become to a state of perfection at the age of six years, you are to apply the pruning-knife to the higher branches¹, to three or four, according to the strength of the plant; and you are to apply a shoulder² stake to each leading shoot, which will be strong enough to support the shoots and the clusters.

XXIII.—CONCERNING PRUNING.

It is proper to begin pruning from the month of February or March, from the fifteenth of February to the twentieth of March. But some prune immediately after the vintage, saying that the vine is relieved when deprived of useless shoots, and that it does not, as in the spring, bleed to destroy its aliment. Those also that are pruned in the autumn shoot earlier in the spring; but if the spring be cold, and the frost attack

¹ *Εκ ὤμων*; literally, "to the shoulders."

² *ὀμοχάρακα*.

attack them, they will be frost-bitten^{*}. It is therefore better in cold situations rather to cut them preparatively, and not thoroughly to prune them, that is, to leave the conspicuous eyes and shoots. It is however necessary to prune in the spring : and one ought to begin the pruning, not in the morning, but when the frost is melted by the sun, and when the shoot has been warmed. One ought also to have very sharp and very[†] good knives for pruning.

XXIV.—FOR FRUCTIFYING THE VINE AND THE MAKING OF GOOD WINE.

THE vine will be fruitful, if the person who prunes it is crowned with ivy ; and if a small quantity of mast of the oak is pounded, and having some vetches ground once, so as to bruise them only, and to drvide them, if you throw them into the places of the plants, it contributes to the strength of the wine and to fructification. Shoots also having many eyes make the vine fruitful, and the transplanting of the vines is conducive

* *Καυθισσεται* ; literally, “ they will be burnt.” In burning and frost-biting, the circulation seems to be affected much in the same manner.

† “ Very cutting,” in the Greek.

ducive to fruitfulness, and to the making of good wine. You will make a vine fruitful, if you plant Glucuriza^a with it.

XXV.—WHEN ONE OUGHT TO DIG THE FULL-GROWN VINES, AND THE UTILITY OF DIGGING.

It is proper to dig before the shooting of the bud ; for, when the clusters are first forming, and when the shoot is growing, the person who digs after the germinating of it, greatly annoys and displaces the fruit by the motion : it is therefore better to dig earlier. But much digging and much working of the ground are the foundation of life and of nourishment and of fruitfulness to the vine. If this is not sufficiently done before the shooting of it, it is better to withhold the digging, and when the germ is become strong, then to work on the trees that were omitted. It is proper to take care the diggers do not wound or injure the stem with the spade, and hurt it ; for the vine that is wounded sickens and becomes unfruitful.

XXVI.

^a Liquorice.

**XXVI.—HOW ONE OUGHT TO DUNG THE VINE
IN THE SEASON OF ABLAQUEATING IT.**

THE inhabitants of Libya and of the East having ablaqueated their vines, do not immediately cover their roots with mould, but suffer the trenches to be open during a whole winter. But the inhabitants of rainy countries cover them earlier, confining the roots, through which their strength exhales, in the ground. Some also make a trench deeper, and some make it of the depth of a foot; and besides the ablaqueation, they manure their grown vines with the dung of oxen, or of sheep, or of swine, or of other cattle. Pigeons dung also, being very warm, is well adapted to make vines shoot early, but it is ill calculated for making good wine. One ought likewise to apply four cotylæ of manure of each kind, of those already mentioned, to each vine. One must not, however, throw the manure over the trunk of the vine, but at a small distance, that the roots that are remote may partake of the heat, and that the manure indiscriminately heaped upon the naked roots may not scorch them: but if there be not a supply of manure, in that case the halm of beans and of other pulse will

will serve instead of manure; for these are of utility to the vines against frost, and they are inimical to noxious reptiles. Grape-stones also make manure, but stale urine is much better. They also moderately ablaqueate and manure vines a year old, and those that are two years old likewise, to five years, according to due proportion: in tempestuous situations, however, it is better to do this to young vines every other year: but if the frost is fixed in those places, it is likewise proper to heap the mould around the trunk: but a person indeed would manure to greater advantage if, in sandy land, he made use of sheep or goats dung, for it is well known that this is good; and, in the white potters clay, of cow dung; for, as it is by nature without strength, the sweetness and the richness of the manure sufficiently cherish it.

XXVII.—CONCERNING STAKING.

SOME cut the poles indeed in December and in the month of January, and some in July and August; and some indeed tie the vines lower, and some higher. But it certainly is proper to tie the Aminean vines a foot higher than the other vines, yet not more than six feet: and in light
and

and dry and sandy land, and in such as is infested by powerful winds, you must make the plant lower, but not less than four feet. You must also sharpen the poles at each end, and you must smear the upper parts alone with boiling pitch, but not those that are fixed into the ground. Let the poles also stand upright, and let them not be bent, lest they make the vines like themselves.

XXVIII.—CONCERNING PAMPINATION.

It is proper to remove the superfluous buds while they are yet tender, for you will afford the vine much relief.* It is also proper to pampinate with the hand with cheerfulness. To prune and to pampinate require the same experience. Wherefore persons of experience sometimes remove a shoot having fruit, and leave one that has none. But it is necessary to take away more buds from a young vine that it may not be overloaded: and when the heat of the sun begins to abate, it is necessary to remove the leaves, that all the bunches warmed by the sun may ripen. The vine also, while in blossom†, ought to be dug.

XXIX.

* Διεπνευσιν means literally perspiration.

† It is possible the original expression might be μη σφιλαι, ought not.

XXIX. — CONCERNING A SECOND PAMPI- NATION.

It is proper to remove what is superfluous about the bud gently and without violence, on vines that are recently planted, as soon as they have budded, after they have shed their blossom. But one ought to clear the leaves at the sides, thirty days before the vintage on vines that have rotten fruit, and that hardly ever bring it to maturity, on account of the moisture of the soil and of the multiplicity of the leaves, that the winds blowing on them may refresh the grape, and you are to leave the leaves towards the top, that, protecting it against the excessive power of the heat, they may throw a shade against the sun towards the top. If moreover there is much rain in the autumn, so as greatly to augment the swelling of ^{the} grape-stones, you are to remove the leaves near the top, that the wine may not become sour. Some indeed in warm and dry situations likewise cover the fruit with dry^x twigs and thorns, if there is not a supply of leaves. Let
the

^x Φρυγανις. Φρυγανη and κλημα are indiscriminately translated *sarmentum*. The first signifies a dry shoot, the second generally a cutting for propagation.

the vintner[†] also diligently go round the vineyard straightening the poles and adjusting the yoke; and the yoke is called the coupling of the vine with the pole, knowing that as we, when inclined to one part of the body, are in pain, so likewise the vines when standing inclined and not straight are hurt.

XXX.—THAT THE VINE MAY NOT PRODUCE VERMIN OR CATERPILLARS, AND THAT IT MAY NOT BE INJURED BY THE FROST.

RUB the bark with bear's fat, and the vine will not produce vermin, or rub^{*} the pruning-knives with which you cut the vines with bear's fat, nobody being privy to it, and neither vermin nor frost will injure the vine; or rub the pruning-knives with garlic pounded with oil. If you also boil the caterpillars that are found on roses, in oil, and rub the knives, the vine will not be injured by any other noxious animal, nor by hoar frost. Or rub the knives with goat's suet, or with the blood of a frog; or you are to rub the whetstone with ashes and oil, and you are then to set the knives. Having burnt shoots of the vine,
and

[†] i. e. the keeper of the vineyard, from *vinitor*.

^{*} See Palladius, lib. i. 35.

and having mixed them with^a the sap of the vine, set them with wine in the middle of the vineyard, and there will be no worms.

**XXXI.—THAT VINES MAY NOT BE INJURED
BY FROST OR BLIGHT.**

DEPOSIT some dry compost in the vineyard at various distances, according to the wind; and when you apprehend the frost^b to be approaching, burn the compost, for the smoke being introduced will dispel the frost. It is also proper to prune the vines that are easily hurt by the frost later, when they may be prompted to bud, for they will then blossom later. Thus then the vine hippuris has been thought to be less obnoxious to frost, because I believe it shoots late, when the sun is warm. Some indeed plant beans in their vineyards, and they believe that their vines will not be hurt by the frost.

XXXII.—ANOTHER CONCERNING HOAR FROST.

If it happens that the vines are hurt by hoar frost, and it is evident that the fruit has perished, it

^a Δακρυον, with the gummy substance that issued out of the shoots that were pruned.

^b Τη παχμυ. Παχμυ signifies hoar frost.

it is proper to cut and to shorten them, that their strength may remain; and they will on that account produce fruit earlier the year following. But some, having learnt it by experience in Bithynia, affirm, when the frost is apprehended, it is proper to ventilate the ashes of the tamarisk in the vineyard; but if there is none, the ashes of any other wood, for thus the ashes resting on the eyes will keep off the assailing frost.

XXXIII.—CONCERNING BLIGHT^c.

As soon as you see the blight rising in the air, you ought immediately to burn the left horn of an ox with some cow-dung, and to make a great smoke round the ground according to the wind, that the wind may blow all the smoke to the place affected by the blight, for the smoke will dispel all the vitiated air. Apuleius also says, that the smoke of three crabs burnt with cow-dung, or with straw and goats dung, are sufficiently serviceable. But if it happens that you
are

^c In Greek, *μυσκη*. It was sometimes called *μυσκη*, because the corn, when affected by it, had the colour of sinople or red earth. The Romans called it *Rubigo* for the same reason, and sometimes *Ærugo*, because it made the grain appear of a copper colour.

are overtaken by the blight, you are to cure the injury thus: having pounded the roots or the leaves of wild cucumbers, or of the colokinthis, and having macerated them in water, besprinkle the things that are affected by the blight before sun-rising. The ashes also of the fig tree or of the oak, macerated and besprinkled, have the same effect. Apuleius also says, if you throw branches of the bay tree over the ground, that what is noxious in the blight passes into them. But it is proper to know that all things are principally affected by the blight when the moon is full, and particularly wheat, because the moon being then very warm, and having a degree of humidity, putrefies the grain in the night. Some indeed having cut the fish *silurus*^d in pieces, burn it, according to the wind, making a smell over every part of the ground. There is likewise a certain antipathy, if the skin of a seal is perforated and stretched round a sieve, and the seed is caused to pass through the sieve, and the ground is sown. This same thing likewise precludes hail from falling, affording relief by some natural antipathy.

XXXIV.

^d Pliny prescribes this, 18, 29, 70. Matthiolus describes this fish, p. 272.

XXXIV.—CURE FOR VINES, THE FRUIT OF WHICH BECOMES DRY.

WHEN the grape-stones, grown to the size of a vetch, begin to become dry, then, having cut the dried part of the cluster and some of the sound part, or rather some of the sounder part near those that are become dry, you are to remove them; then rub the incision with ashes mixed with very sharp vinegar: but those ashes are better which are from the shoots; for thus the parts of the cluster going to be affected, being rubbed, will stop the injury: rub the stem of the vine also all around in the same manner. Some also besprinkle the lower parts of the stem near the roots with old and very pungent urine; for by this application not only the fruit will be saved, but the vine also will be long-lived and flourishing.

XXXV.—CONCERNING STERIL VINES.

MAKE an opening in the trunk with a knife or with an auger, or rather with an oaken wedge; and lay a stone in the opening, that the parts of the trunk may be separated the one from the
 VOL. I. N other,

other, and pour in about four cotylæ of stale urine, pouring it gently over all the trunk, so that it may drop down to the roots; then lay on some dung mixed with earth. It is necessary however that they who fix a stone in the trunk should dig round the roots; but you are to apply the remedy seasonably in autumn.

XXXVI.—CONCERNING SIDERATED VINES.

You will know the vines that are planet-struck indeed from this: they have their leaves of a most extraordinarily red colour: but you will cure them if you perforate the lowest part of the trunk with an auger; and if you fix an oaken peg in the hole, or if you lay the roots a little open and apply the peg in the same way, and lay on the mould, you will then cure the vines. Some indeed irrigate such vines with sea-water; but others, having boiled oil with asphaltos, rub them, and such as have been hurt by any iron instrument, all around. Others, as in Bithynia, have from experience got the method to cure blasted vines by driving a nail through the lowest parts of the trunks: others indeed pour urine over the trunk and over the roots.

XXXVII.

XXXVII.—CONCERNING DISEASED VINES.

BESPRINKLING the trunk of a diseased vine with the ashes of the shoots or of the oak, mixed with vinegar, you will cure it. Urine^e also poured over the roots is of great use. Some likewise cut morbid vines near the earth; they then cover them lightly with the adjacent mould, having mixed a little dung with it; and when the buds shoot, they indeed remove those that are weak, and they leave those that are generous; and the following year having selected the most suitable one of those that were left, they remove the rest.

XXXVIII.—CONCERNING LACHRYMAL VINES.

VINES that shed many tears throw them out crude, and not distributed over the whole body of the vine. We are then to make an impression with a pruning-knife on the trunk, and we are to make an incision^f; and if what is done is of no use, we are likewise to make an impression

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on

^e The Greek says, human urine, in this and in other passages where it has been mentioned.

^f A wound, in the Greek.

on many of the roots; and we are to make an incision in them by some means; and we are to rub the cuts with amurca boiled to half its original quantity, and cooled: and we are to rub the eye that lies near^z the incision externally, which has been proved to be much better.

XXXIX. — CONCERNING VINES CALLED
RUADES.

You will know the vines called *Ruades* from their leaves, which are whitish and dry, and having their shoots broad and like thongs, and tender. You are then to cure them with ashes mixed with very sharp vinegar, rubbing the inferior parts, and besprinkling the parts about the stem particularly; and you are to pour the ashes, when they are wet, over the vines: but some pour sea-water over their roots; and some are careful to remove the upper parts of the bunches, and to prevent this. They have indeed been called *Ruades*, which do not retain their fruit, from^b the circumstance of its falling off.

XL.

^z Under, in the original.

^b Ρυαδὶς ἀπο τῆ γῆς.

XL. — CONCERNING VINES LUXURIANT IN WOOD.

It is necessary to prune¹ the vines luxuriant in wood; for when they are disburdened of their shoots, they are eased; but if they continue,² having ablaqueated them, we are to apply river sand, and a moderate quantity of ashes to them. But some lay stones round the roots, that they may cool the vine.

XLI. — CONCERNING THE VINES THAT PRODUCE ROTTEN FRUIT.

THERE are some vines which, having produced fruit, putrify the clusters before they are cherished and become ripe. You are then to cure such as these with the leaves of purslane. But some having mixed barley-meal¹ with the purslane, rub the trunk around; others rub half of
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¹ Μακροτομῶν, to prune them so as to permit them to grow to a proper length.

² Ὑπομαίνω, i. e. to run into exuberance, seems to be understood in this place.

¹ Ἀλφίτου, meant the meal of barley that had not been parched.

the cluster with purslane; some also throw four cotylæ of stale ashes or sand over the roots.

XLII. — CONCERNING VINES HURT BY THE SPADE.

IN relation to a vine hurt by the spade, or by any other instrument, if the wound is under ground, let it be covered with very fine earth, having mixed goats or sheeps dung with it, and bind it; then stir^m the earth round the stem, and take care of the vine: but if the wound is about the root, having mixed some fine manure with some light earth, lay it on, and dig round it frequently, turning the shoot around, not bending it towards you, and use no violence.

XLIII. — HOW IT IS POSSIBLE TO KNOW BEFORE THE VINTAGE THAT IT WILL BE A PLENTIFUL AND GOOD, OR A BAD WINE SEASON.

TAKE a grape-stone, that is a grain, with your fingers, gently from the bunch, and if any moisture bursts out of it, it is an evident sign of plenty. Some also, if there is a plentiful crop of

^m Περισκελλειν sometimes means to dig around with the *sarculus*.

of wheat, affirm that there will be plenty of wine fruit likewise. We conjecture too that the wine will be good and powerful, if there are many showers during the spring; the showers indicate the same thing when the grape is of the size of a vetch, and is at the same time of a sour taste. But rain that falls during the season of the vintage, will make the wine not only watery, but liable to turn also.

XLIV.—PREPARATION FOR A HEDGE.

If you wish to have a secure hedge, having dug a trench a cubit^a deep, fix stakes in it, and stretch a rope along the trench: but let there be some vetches ground in readiness the day before; and the seed of the bramble, and of the paliurus^b, and of the oxyacantha^c, being all macerated to the consistence of honey, lay the seed of the bramble, and of the paliurus, and of the oxyacantha, on the extended rope; and having besprinkled the place with^d the stuff, permit it to

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^a = 1 foot 6.13125 inches.

^b A species of thorn, Matth. l. i. c. 104.

^c The Latin name is *acuta spina*, Matth. l. i. c. 105.

^d Το αποβερματι. Αποβερμα means the act of pouring out any liquid substance.

remain a short time; then lay on the earth that was thrown up out of the trench; and after eight-and-twenty days it will produce shoots of the length of four palms, which you are to transplant into a trench that is not deeper than four palms and they will grow more than a cubit in two months; then, being drawn to a great length, they will keep off thieves. Do this at the vernal equinox. You will also make a hedge expeditiously, if, having rubbed a rope with the seed of the bramble, and having dug it into the ground, and cutting some thick reeds, you plant them to a moderate depth, laying them in an oblique position, not straight, throwing some manure in with the earth. But some make a hedge in this manner:—making cuttings from shoots of the bramble, and laying them in the hedges, they bury them a palm deep, and they water them till they shoot. Some also rub a rope with the berries, that is, the seed of the bramble, when they are ripened, with their hands; then having laid on some earth with dung, they water them till they shoot. But Democritus says that a hedge is properly planted in this manner fifteen days from the beginning of the spring.

^{Rub} But a rope that has been much used at sea, and
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* A palm was equal to four fingers breadth.

is become rotten, with the seed of the bramble, and with the other fore-mentioned seeds of prickly plants, and with vetches*, and cover them in the trench, and water them, if it can be done, every day; for thus the hedge will grow speedily and perfectly, and it will be a secure fence.

XLV.—HOW IT IS PROPER TO GATHER THE VINES, AND WHAT ARE THE SIGNS OF MATURITY IN THE GRAPES.

It is not easy thoroughly to know when it is proper to gather the grapes; wherefore some, gathering them before they are ripe, render the wine small and weak, and such as will not keep: others, gathering them later, not only hurt the vine labouring under its burden longer than it is necessary, but if hail or frost happen, they will have their wine injured. There is then a proof of the season of the vintage, not only from the taste, but from the sight also; and we will hand down some of the indications. For the followers of Democritus and of Africanus say, that the grape continues in a state of perfect maturity six days, and not more: if then the kernel is not of a transparent green colour, but black,

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* Called *αγέλας*.

it indicates that it is ripe ; but others press the grape-stones, and if the kernel gets out naked, not having any of the fruit about it, they prove that the grapes are ripe for the vintage : but if the grape-stone gets out with part of the fruit, they say they are not ripe. Some also conjecture that the grape is ripe from the beginning of making "dried grapes. Others indeed prove that the grapes are ripe thus : where a bunch is very thick set, they take one grape-stone thence ; after a day or two they examine the bunch ; if therefore the place remains the same in respect of appearance, when the adjacent grape-stones do not increase in size, they accelerate the vintage ; but if they see the place of the grape-stone lessened, as when the fruit increases all around, they procrastinate the vintage as long as the increment goes on.

† *Τὸν σαρκαρ* ; literally, of the flesh.

▪ The *uvæ passæ* of the Romans.

XLVI.—IN WHAT HOUSE OF THE MOON IT IS NECESSARY TO GATHER THE VINTAGE, AND IT IS PROPER TO DO THE WORK OF THE VINTAGE, WHEN IT IS IN THE WANE, AND WHEN IT IS UNDER THE EARTH.

It is proper to gather the vintage when the moon is in Cancer or Leo, or in Libra, or Scorpio, or in Capricorn, or Aquarius; it is also necessary to hasten to do the work of the vintage when it is in the wane, and under the earth.

XLVII.—HOW IT IS PROPER TO REMEDY THE GRAPES THAT ARE BECOME SOUR, OR OTHERWISE INFECTED, AND TO CURE THE WINE THAT IS TO BE MADE FROM THEM.

It is necessary to separate all the sour grapes, or such as are otherwise tainted, from the rest of the fruit, and to cure the Must made from them thus:—You are to boil rain water to half its original quantity; from this water that is boiled, pour into the wine as much as a tenth part of the Must, and boil it again with the Must, so that a tenth part of it may be consumed in the boiling. Some indeed do not manage it in this manner; but

but they throw water on the grapes, apportioning the third part to the future Must; and when the grapes are afterward trodden, they boil the Must so that a third part of it may be consumed.

XLVIII.—CURE OF NOXIOUS ANIMALS THAT INFEST THE VINES.

WORMS that infest the vines, or that breed in a part of the vineyard, will be destroyed by burning cow-dung according to the wind: and some having made a suffumigation of galbanum, or of hartshorn, or of goats hoofs, or of ivory dust, or of the root of a lily, in the vineyard, have driven noxious animals thence. You will also keep off noxious animals, having made a suffumigation of women's hair, and you will cure women subject to abortion by it; for they cure such affections by a suffumigation of women's hair. Others having made a suffumigation of the herb *pæonia, and others of that which is called *prosopitis, or having planted them in the vineyards, drive away noxious animals. Some also, having boiled laserpitium and oil, rub the stems of the vines, having begun a little above the

▼ Peony; Matth. iii. 140.

* Supposed to be Burdock; Matth. iv, 101 and 102.

the ground. But that caterpillars may not injure vines, rub the pruning-knives with garlic that is well pounded.

XLIX.—AGAINST CANTHARIDES, AND THE LARGER ANIMALS THAT INFEST THE FRUIT.

BUT that cantharides⁷ may not hurt the vines, besprinkle the cantharides with oil, and rub the grindstone on which you are going to set the pruning-knives; but some, to keep off larger animals, macerate canine fæces in stale urine, and besprinkle all things around.

L.—A PHYSICAL PARADOX OF DEMOCRITUS, FROM FREQUENT EXPERIENCE, THAT NEITHER VINES, NOR TREES, NOR CORN GROUNDS, NOR ANY OTHER THING, MAY BE HURT BY ANY, AND ESPECIALLY BY THE LARGER ANIMALS.*

THROW a great many river or sea crabs, not less than ten, into an earthen vessel with water,
and

⁷ Commonly called Spanish flies. They are found in Spain, Italy, France, and some parts of Germany, chiefly in the spring season, on poplar and ash trees. As these trees were used in the *arbustum*, it is likely that the vines of the Greeks and Romans were not a little incommoded by them.

* Of the noxious kind.

and having put on the cover, set it in the open air, that it may be insolated during ten days: then what things soever you wish to remain unhurt, besprinkle them with this water, using it regularly until they increase, and you will wonder at its efficacy.

LI.—CONCERNING CENANTHE.

YOU are to gather the cenanth^a from the vine that produces sweet wine, and from the wild vine, and chiefly from the arbustive vine: and you are to gather it in the flowering season, the bunches being indeed taken and dried in the shade: and the flowers being put into a clean jar, you are to pour in a proportionable quantity of old well-flavoured sweet wine. You must wring them carefully with your hands, and reduce them into masses, and lay them by.

LII.—CONCERNING THE MAKING OF THE DRIED GRAPE.

MANY things have indeed been said by the ancients concerning the making of the dried grape,

^a Flower of the vine. It is often used for the flower of the wild vine, called *labrusca*.

grape, and I have been induced to manage it in this manner. Having twisted the ripe bunches from the shoot, permit them to wither on the vine, and having afterward removed them, hang them in a shade, and lay the dried grapes in a vessel, having strewn vine leaves dried by the sun under them; and when the vessel is filled, lay vine leaves again over them; and having put on the cover, lay them in a repository that is cool and free from smoke; for that which is thus preserved is the dried grape, and it keeps a long time, and it will be very sweet.

LIII.—CONCERNING A REED PLANTATION.

REEDS like situations that lie well to the sun, and they are nourished by the winds: but they are principally planted indeed with roots, for this is the more eligible method of planting them. The reed likewise being laid in an oblique position will easily shoot: let them also that are set be at a due distance from each other, and let them be set to the depth of three or four fingers; and it is necessary that one or two of the eyes of those that are set should look upwards: and it

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is necessary that those which are planted straight should have two joints, and that they should be planted to the depth of 'eleven fingers. But the time of planting is, as some say, in the beginning of the spring, since they are so soon hurt by the frost. It is proper to plant them in cooler situations about the autumn. The reed is also out the same year after the winter solstice, for the reed has been thought to increase to that period. They likewise say that the reeds set in the smoke do not breed the worms called *ikes*,^a which very much hurt the vine; for they say that these animals grow on vines, from reeds that are thoroughly rotten.

^a *i. e.* Eleven fingers breadth. In some manuscripts it is twelve.

^a Some of the Greek etymologists say, that there are worms which eat the vines, or the eyes of the vines. In some copies it is *ikes*.

BOOK VI.

HYPOTHESIS.

These things are contained in this Book, being indeed the Sixth, concerning the select Precepts of Agriculture, comprising the preparation of the press, and of the vat, and of the oil-press, and of the wine-cellar, and the standing of the casks, and the method of making and pitching them, and the preparation for the vintage; and how it is proper to tread the grapes, and how to lay up the must in the casks, and that it may not ferment, and how one may have must all the year, and to know whether it has water, and to remedy it when it is acid; and concerning the using of

I.—CONCERNING THE WINE-PRESS, AND THE
VATS, AND THE OIL-PRESS.

HAVING finished what we had to say concerning the planting of the vines, and now proceeding to explain the remaining part, concerning the care and medication⁴ of the wines, we have

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^d By medication, is here meant the cure of the wines that were tainted.

thought it necessary to premise how to prepare the press and the press-vessels. One ought therefore to build the press to receive the abundance of the succeeding fruit, so that there may be sufficient room for the workmen, and that there may be space enough for laying down the grapes, and that in time of necessity it may receive the fruit when pressed, and that the workmen may not be suffocated by the steam of the must. All the press-room ought to be covered on all sides with very fine plaster, and the ceiling not less so, that no filth nor any animal bred in it may fall and taint the wine. Let the press also be kept warm, and let it have plenty of light on all sides; and let the vat have a wide mouth, and let it be washed with sea-water or with hot brine, and let it be wiped with a sponge after it is used, and let it be left without a cover, lest it become mouldy. And since mice sometimes falling into the vat make much ill scent, you are to lay a wide piece of wood, by means of which a mouse may run up when it has fallen in; and when a person is going to use it again, when it is washed and wiped with a sponge in the same manner, let him fumigate it. The oil-press must be also under cover.

II.—CONCERNING THE WINE-CELLAR, AND THE STANDING FOR THE CASKS.

LET the building which receives the casks have a window; in warm situations indeed toward the east and the north, but in such as are colder toward the south. But let the press-vessels be removed from all bad smell; and you are to place the casks so as not to touch each other, having left the distance of a foot between them, that the persons that have the care of the wine-cellar may have easy access to the interior casks, and that, if one cask turn sour, it may not affect the others that are near; for nothing takes infection so soon as wine, and especially the must. You are also to set the casks in dry situations, so that two parts of them may be under ground, if the country produces weak and thin wine, and such as is not nutritious; and if it produces what is powerful and rich^f, the half of them is to be covered. You are likewise to throw some coarse and dry sand under every cask, and you are to strew a due proportion of the sweet^g rush over this, and you are to fill the rest with mould that

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has

^f *Kai πᾶς σῶμα*, and having a body.

^g Of the perfumers rush, in the Greek.

has been thoroughly dried in the sun; for sand and dry mould draw all moisture to themselves, both from the ground as well as that which is on the casks, and they make the wine sweet. Any person may prove the power of it thus: for if, having filled a new basket with sand, you pour sour wine into it, it will be percolated pure and without any disagreeable smell; but if you have no sand, you must use such mould as you can have, that is previously insolated. You must not have^a any thing that has an unsavoury smell in the wine-cellars, as the stink of hides, cheese, garlic, oil, figs, useless vessels; for all such things drawing moisture from the wine become nasty, and they in return impart a disagreeable flavour to the wine. It is also necessary that the wine-cellar should be remote from common sewers, and from the stables, and from a recluse situation, and from the place where the straw is kept, and from the bakehouse, and from the bath. If there are also any trees found near, let them be cut down; for their roots spreading around and raising a bad smell, and especially those of fig-trees, and those of wild figs still more, and those of pomegranates, are perdition to it: and if we live in the country, we are to lay a pavement

^a Confine, according to the Greek.

ment with brick raised high, and upon the pavement thus laid we are to set the casks, throwing some sand under them.

III.—CONCERNING THE MAKING OF THE CASKS¹.

ALL earth is not fit for pottery; but some indeed prefer the clay of a yellow colour, and some the white, and some mix both together. Some moreover are satisfied with the proof of the cask being well fabricated, if, when touched, it makes a certain shrill and clear sound. This indeed is not all; but it is necessary that the maker should be present at the operation, and that he should previously know that the clay is well wrought, and not to suffer it to be applied to the wheel before the clay indicates the quality of the cask when it is burnt. The potters do not make all casks on the wheel, only the small; they indeed daily fabricate such as are of a larger size, set on the ground in a stove², and they make them quite large. But the burn-

o 3

ing

¹ In Greek, *πίθος*. Notwithstanding they were made of potters clay, I have called them casks, as we thus call vessels appropriated to the holding of liquors. Jar, which comes from the Italian *giarro*, seems hardly adequate to express what *πίθος* signified.

² A hot-house, in the Greek.

ing is not an inconsiderable part of the potter's art: and it is necessary to make the fire neither too small nor too large, but exactly proportionable. For this reason some, declining the difficulty of so much preparation, use the old casks, which is very hurtful to the wines. Of the casks indeed that extrude into belly, those that are long are the best, and especially those that have wide mouths. You are also to make the edges of the casks shelving externally, that when we cover them with ashes¹, nothing may fall into the cask when we open it, but that it may get down on the outside. You are likewise to pitch them immediately while they are hot. But let not the casks be too large; for in such as these² the wine does not ferment too much, and which not being too much confined, rises and works, and not only throws out what is ill-flavoured, but the yeast likewise. Small vessels also contribute much to the preserving and to the making of good wine: it is therefore proper to make the casks small. But if we previously have old large casks, let us pour into them the weaker and inferior wine, but that which is of superior quality into such as are small.

IV.

¹ The Greek word implies that the ashes were mixed with something of an unctuous quality.

² i. e. in such as are not too large

IV.—CONCERNING THE SEASON AND METHOD OF PITCHING THE CASKS.

You are immediately to pitch the new casks when taken from the hearth, and such as are old, at the rising of the dog-star; and some indeed pitch them every year, and some every other year; but it is better to pitch them when the wine becomes pricked, or when the pitch being laid on is in a state of fluxion.

V.—PROVING OF PITCH.

THE ancients have handed down to us that the best pitch is that from Ida; after this, that from Pieria^a. But some prefer the Rhodian, and some the Rhetæan^b pitch: and generally that which is shining is of superior quality; the more it shines, the better it is; but that which is thin, is rejected as being good for nothing. Some indeed, having heated it, pour it into water, and they prove it not only by the smell, but by the taste also: and that also which in boiling does not fly^c or rise in bubbles,

o 4

bles,

^a This was in Macedonia, on the Sinus Thermaicus.

^b *Perrus* was a city of Troas; Strabo, lib. xiii.

^c i. e. burst with explosion.

bles¹, or is not turbulent, has been approved as very good. That also which is of a sweeter taste, and more pure and more smooth than common, and of a good smell, is of superior quality; and pitch that has been boiled is better than that which is raw, and that which is dry than that which is moist; but the best pitch is prepared in this manner: it is put into an earthen vessel, and it is put over a small fire in the sun, then some hot water percolated through wood-ashes is poured on it, and the pitch is stirred; when it has afterward stood, it is poured out after two hours, then there is as much water again poured in. Having therefore done this thrice every day for three days, and having taken up the moisture on the surface, they make the pitch that is left exceedingly good. Dry pitch is also bitter, but being boiled with wine it becomes more useful; and especially if any perfumes are boiled with it, it will be better; and having boiled the mixture to a third part, they use it as properly qualified: but some throw wood-ashes into it, and boil it down, and they also add wax to the ashes. Some likewise pour a lixivium of ashes and old wine into it. Some put in wax by itself; and they mix that which comes from Sardinia, for they say this is

¹ Or make a noise, is the Greek expression.

is more eligibile; and some indeed melt a fourth, and some a sixth, and some a tenth part; for if we wish to make the wine more harsh, we are to throw in more wax. But some advise not to throw any wax into the pitch, for the wine becomes more bitter, so that it soon turns sour.

VI.—COMPOSITION OF PITCH.

IN Italy they use pitch^{*} of this kind: forty minæ[†] of pitch, one of wax, eight drams[‡] of sal ammoniac, six drams of manna[§]. Thus, having pounded them and boiled them together, they sprinkle eight ounces of well-ground fenugreek over them, and they pitch the cask with them when they are well mixed. Others indeed use this: a pound of dry pitch, fifteen minæ of wax, three pounds of ground vetches and wheat, an equal quantity of well-dried fenugreek pounded
and

^{*} A figurative signification of the word *sincerity*, looks as if it alluded to this circumstance, and it seems to be fabricated from the words *sine cerd.*

[†] The common Attic mina was 11 ounces, 7 pennyweights, $13\frac{1}{2}$ grains.

[‡] The drachma of the Greeks consisted of 6 oboli: it was 2 pennyweights, $6\frac{1}{4}$ grains.

[§] Called *Adamo*; Matth. i. 72.

and sifted, five pills^v of *calamus^v aromaticus*, and of the leaves of *malabathrum^x*; having melted the ingredients that may be dissolved, and having pounded such as are dry, they sprinkle over them half a mina of sifted hepatic^v aloes. This pitching is the most approved which will strengthen weak wines, and it preserves those that are apt to turn in a state of integrity, and it makes them well-flavoured.

VII.—GENERAL PRECEPTS ABOUT PITCHING.^{SV}

IN all the ways of pitching it is best to wash the pitch with a lixivium of ashes, and to mix it with resin of the lentisc or of the pine; but if you have not this, it is proper to mix such as you have, and a proportion of iris and of fenugreek, for the fenugreek makes the wine more powerful and of a better body; and some *costus^v*, and *cassia^a*, and *melilot^b*, or the flowers of *schoinae^v*;

^v Σφαίρια.

^x Sometimes called *calamus odoratus*, sweet-scented flag; Matth. i. 17.

^x It is called the Indian leaf; Matth. i. 11.

^v The common aloe is so called.

^x Matth. i. 15.

^a Παρά το κασσί, from its fragrance; Matth. i. 12.

^b Called also *sertula campana*; Matth. iii. 41.

schoinos^c, for these contribute to a pleasantness of flavour. But in general it is expedient to use various^d modes of pitching, when wine is good and well made^e: and in respect of wines that are not expensive, it is necessary to be satisfied with good pitch, and to throw in a moderate quantity of iris and fenu-greek, and a much smaller quantity of wax; for more being thrown in, turns the wine^f, as we have already said. It is indeed necessary to use white wax, or if not white that which is clean. Some do well, and set a reed and a piece of wood straight in the empty casks, that the small flies or animals of this kind, falling in, may have the means of ascending by these. It is not proper to pour the best wine into casks that are just pitched, but that which is turned, for^g it will make it better: and you are to pour likewise the black wines into such as these, and the white into such as have been pitched two years or even more.

VIII.

^c By Columella called *schænum*, xii. 10; it is the *juncus odoratus*.

^d i. e. pitching made of various ingredients.

^e Made in an agricultural manner, in the Greek.

^f In cap. v.

^g As, in the Greek.

VIII.—ANOTHER APPROVED METHOD OF PITCHING.

Mix two pounds of Cretic or of Campanian hyssop, two pounds of Indian or of Celtic^b nard, half an ounce of good aloes, half an ounce of Sicilian crocus, a pound of Illyrian iris. After the pitching of the casks, according to the measure of ten amphoræ, apply in due proportion to the sides and under the edges pitch that is neither very cold nor too hot, lest the preparation be scorched. Then pour in the new wine; and having tasted it, in a few days you will imagine that it is of a good flavour and old. Pitch the casks also according to custom, either every year or regularly every other year, using the proportion and composition of ingredient^d as it has been prescribed.

IX.—CONCERNING THE STOPPING OF THE CASKS.

SOME persons, after the pitching, a short time before the tunning of the must, smear the casks; some

^b Sometimes called *spica celtica*. The dried roots are now brought into England from the Alps; Matth. i. 7.

^d Φαγμαν; of medicament, literally.

some indeed the mouths only, but others smear the lids. But the stopping is with pitch, with sapa^t, and sea-water. Some indeed, having poured tar and brine into the sapa, and having mixed them, smear the mouths of the vessels with a sponge; but others cover the lids with amurca^t only.

X.—CONCERNING THE PREPARATION FOR THE VINTAGE.

You are to open the presses twenty days before, thatⁿ they may be aired, and you are to besprinkle them with sea-water, and you are to suffumigate them.

* Some of the Latin writers say that it was sweet wine boiled down to half of its original quantity. Palladius says it was boiled down to a third part, lib. xi. 18.

† The watery sediment of the olive oil.

‡ *In dampore*; that they may transpire.

XI. —WHAT THEY WHO HAVE THE CARE OF THE PANNIERS OUGHT TO DO; AND HOW THE GRAPES ARE TO BE TRODDEN; AND IN WHAT MANNER THEY WHO ARE APPOINTED TO TREAD THEM, MUST CONDUCT THEMSELVES IN THE PRESSES.

LET those who preside over the larger baskets, that are called panniers, pick the leaves, and if any sour grapes are brought, or any dry bunches are found^a. They also who tread, must pick them, if any thing has escaped those who preside over the baskets; for the leaves being pressed with the grapes render the wine more rough, and apt to spoil; and from sour and dry grapes there arises consummate harm. Let those who are appointed for this purpose, immediately press with their feet the grapes that are thrown into the presses, and having equally trodden all the grape-stones, let them take up all the kernels, that is, the refuse, so that the greatest part of the liquor may run into the vat; and when they have trodden them a second time, let them be removed;

^a *Εκλογισθῶσι*, i. e. let them pick them, seems to be understood after this word.

removed ; and having made the kernels warm and not too moist, let them then lay them under the press board, for being warm and tender they become more fluid. But if they are set under very wet, it is necessary that being laid together they should be broken, a weight being laid on them. The men that tread indeed must get into the press, having^o thoroughly cleaned their feet, and none of them must either eat or drink in the press, nor must they get in and out frequently ; and if there is any necessity of going out, let the person not go with naked feet. The men that tread ought also to be dressed^p, and to have their girdles, on account of the violent sweating. It is likewise proper always to think of suffumigating the presses, either with frankincense, or with some other sweet odour. It is indeed proper to know that the *stempfula*^q are not the insides of the olives only, as some persons think, but they are also applied to the refuse of the grapes. If therefore you hear the word, bestow attention on

^o Having well cleaned the parts about the feet, is the Greek expression.

^p To be full dressed, in the Greek.

^q *Στεμφυλα* signifies the same thing as *γυαγα*, as well as the kernels of the olives.

on the subject, as indeed the grape-stones are sometimes so called, and sometimes the inside of the olive is thus denominated.

XII.—HOW THE MUST IS TO BE POURED INTO THE CASKS AFTER THE TREADING OF THE GRAPES IS FINISHED.

It is proper that the casks should be washed with a sponge with genuine brine before the must is tunned, and that they should be fumigated with frankincense. It is also necessary to fill them neither too full nor yet too sparingly, but to form a conjecture how much the fermenting must is likely to increase, that it may not work over, and that the froth rising to the edges, it may get rid of what is impure only: it is also proper to skim the must in the casks regularly for five days with your hands, and with skimmers, and to take away the froth, and any thing else that may be superfluous, and to remove all the filth about the casks, and to convey it to a considerable distance; for if all this remains near, small flies are bred from it, when it is putrefied, and there arises a bad smell, both which make the wine turn. It is moreover proper to think of keeping the presses sweet by suffumigations, and especially in the wine-cellars

**XIII.—THE GRAPE-STONES BEING IMMEDIATELY
THROWN OUT AFTER THE DRAWING OF THE
MUST FROM THE PRESS, HOW WHAT IS CALLED
THAMNA MAY BE MADE OF THEM.**

THE refuse, that is, the kernels, are immediately to be thrown out after the draining of the must, and they are to be put into casks, and to be trodden down; for the inferior wine from these, which they provincially call *thamna*, is not an unpleasant drink for the labourers, and the kernels that are remaining will afford proper nourishment to dumb creatures. It is also necessary, when the grape-stones are taken out of the press, immediately to rinse the press and the press-vessels, and to wash them with sea water or with brine, and to fumigate them; for the moisture that is left turns quite sour, and it will spoil the fruit trodden the following day, and it breeds small flies, which is a sign of the wine being turned.

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XIV.

¹ Τρυξ. It was sometimes called *δευτερας*, and by some of the Greeks *σιμφυλτης*, and by some *ποτιμος* and *θαμνα*. The Romans call it *lora*.

² Αλογους.

**XIV.—THAT THE NEW WINE MAY NOT WORK
OVER.**

LET us lay a chaplet of pulegium*, or of calamintha", or of origanum", around the necks of the vessels : and some rub the inside of the casks about the edges with cheese made of cow's milk ; for it will keep down the fermenting" new wine.

XV.—TO RENDER THE NEW WINE FIT FOR USE.

Pour into a measure a cotyla of sweetish" vinegar, and after three days it will be clear : but concerning the fining of new wine more expeditiously, you will find the best means in the third book of Diophanes.

**XVI.—TO HAVE SWEET WINE ALL THE YEAR,
AND TO KNOW WHETHER IT IS DILUTED.**

BEFORE treading the grapes, pour the liquor that drops voluntarily from them, the same day, into a vessel pitched within and without, so that the
vessel

* Penny royal.

" Calamint ; Matth. l. iii. c. 36.

▼ Matth. iii. 28.

▼ Γλυκος ; literally, sweet wine.

* Οξυς γλυκαζοτος. This was made from honey. Galen, comment. iii. p. 572.

vessel may be half full, and stop it carefully with gypsum, for the must remains exceedingly sweet for a long time : but it will be preserved still better, if, the vessel being stopped with a skin, it be thrown into a well during thirty days, for, on account of its not fermenting, it will always be sweet. If any one will likewise tread the grapes gently so that they may not be pressed hard, he will have this kind of must fit for use for a considerable time. Some pour the must into old vessels, that have had old wine in them. Some place the vessel pitched within and without, as it has been already mentioned, in a fountain, so that the edges only may remain out: and this has been proved to be very useful. Some bury the vessel in moist sand. Some dig and keep wet sand on² the grape-stones; others, putting the must in a vessel that is not pitched, and having pounded some Alexandrian^a nitre, lay it in a

P 2

shady

¹ The Greek says vessels, which does not seem to be accurate.

² They first covered the vessel with the grape-stones, and they then heaped on the wet sand.

See Pliny, lib. xxxi. 10; and Dioscorides, lib. v. Matth. v. 80.

shady place. But if the must is diluted, you will find it in the following chapter.

XVII.—TO KNOW IF THE MUST IS DILUTED.

THROW some wild pears, that are very sour, into the must; and if it is mixed with water, they go to the bottom; but if it is not, they swim.

XVIII.—CONCERNING THE PREPARATION OF GYPSUM.

You are to put the gypsum in a wide vessel, and you are then to pour on so much must that it may cover the gypsum; and you are to move it frequently, and you are thus to permit it to subside, that the grosser parts of the gypsum may fall to the bottom: and you are to take^b up the superficial part of the must, so that none of the gypsum may be mixed with it, in the act of removing it.

XIX.—TO AID MUST THAT IS GETTING ACID.

You are to pour into the amphora some dried grapes, macerated until they swell, and two
cotylæ

^b To draw up, in the Greek.

cotylæ of pressed grapes; or you are to percolate it through river^c sand, as it has been already mentioned: or you are to throw in four drams of Sandyx^d.

^c I believe the passage referred to, does not express *river* sand; c. ii.

^d Sandarach, probably. A sort of arsenic is in modern times brought into England from Africa, under this denomination. See Pliny, xxxv. 23. Matth. v. 81.

BOOK VII.

HYPOTHESIS.

These things are contained in this Book, being indeed the Seventh, in relation to the select Precepts of Agriculture, and comprehending a Treatise on the difference of Wines, and concerning the cure of them, and the tasting of them, and the transferring of them into other vessels ; and other useful things.

I.—CONCERNING THE DIFFERENCE OF FRUIT.

HOLLOW situations produce much wine, and what is faulty ; but such as are high yield what is better, the fruit being indeed matured by the winds, and by the temperament of the air, and especially by the sun's power ; for the sun not only makes the grapes more powerful, but more sweet likewise, if it throws much heat on them. But the moon being warm and moist, only matures the grapes, and the night only renders them sweet. There is therefore a want of much insolation, that the wine may be durable, which the sooner it comes

comes to perfection, the sooner it also evaporates*. The fruit also coming from warm situations makes the wine more durable; but that which comes from other parts, or from such as are ill cultivated, makes the wine languid and weak. If the vine produce few grapes, it makes the wine more powerful, because it bestows all its strength and power on that fruit exclusively.

II.—TO WHAT WINES A PLACE IN THE OPEN AIR MAY BE ADAPTED, AND TO WHAT SORTS SUCH AS IS UNDER COVER.

You are to place the more powerful wine in the open air; but let it be averted from the west and from the south, by some walls built before it: but you are to set the thin wines under cover, and it is necessary to make the windows higher, turned to the north and to the east.

III.—CONCERNING THE DIFFERENCE OF NEW AND OLD WINE, AND OF THAT FROM THE WHITE AND BLACK GRAPE.

The black grapes will produce more powerful wine; the white, that which is middling. The

* Transpires, in the Greek.

† Placed, in the Greek.

new wine is very cold, and the old is very genial,
and very powerful, and very well flavoured, for
time consumes^a what is watery in it.

IV.—HOW ONE IS TO CURE, AND TO RENDER
DURABLE, THE WINE OF GRAPES THAT HAVE
BEEN TOO PROFUSELY WETTED WHILE ON THE
VINE, AND OF THE GRAPES LIKEWISE WETTED
AFTER THE VINTAGE.

If, when the year is rainy, it happens that the
grapes on the vine are too much wetted, or if it
so happens after the vintage, when violent showers
fall, that they are more than sufficiently irrigated,
we are necessarily to tread them. If you also
understand that the must pressed after the vint-
age is too weak, and the taste will discover this
when the wine is poured into the casks, and¹ it
has fermented the first time, let² us immediately
remove it into other casks (for all the gross sedi-
ment remains at the bottom on account of its
gravity), throwing three cotylæ of salt to ten
measures

^a According to the original meaning of the word in Arabic.

^b Αναλίσκει; takes up.

¹ Καὶ τῇ πρώτῃ ζύσῃ ζύσῃ; literally, "and it has fermented
the first fermentation". *Orientalism*.

² The transition as in the original.

measures of wine : but some, acting with more useful propriety, boil the wine till a twentieth part of it is boiled away, throwing¹ in a hundredth part of gypsum. The Lacedemonians let their wine remain so long on the fire till the fifth part is boiled away, and they use it after four years.

V.—CONCERNING THE OPENING OF THE CASKS,
AND WHAT IT IS PROPER TO OBSERVE AT THE
TIME OF THE OPENING OF THEM.

It is proper to open the casks when you have observed the rising of the stars, for then the wine is in a degree of commotion, and it is not right to touch it: and if you open a cask indeed in the day-time, you must observe the sun, that its splendour may not fall on the wine: and if you are to open a cask in the night, necessity often pressing it, it is proper to attend to the light of the moon.

¹ Palladius mentions this, Oct. xiv. 4.

VI.—CONCERNING THE MOVING OF WINE FROM ONE VESSEL TO ANOTHER; AND WHEN IT IS PROPER TO RACK WINES; AND THAT WINE THAT HAS BEEN POUED INTO THE SAME CASK, DIFFERS.

It is proper to remove the wines from one vessel into another when the northern winds blow, but by no means when the winds are from the south; and the more weak wines indeed, in the spring; and such as are more powerful, in the summer; but such as are in dry situations, after the winter solstice. But the wine that is removed into other vessels, when the moon is full, becomes sour; and it is proper to know that wine separated from the lees, which nourish it, becomes thinner and weaker. You are moreover to provide that it may be kept warm indeed in the winter, and that it may be cool in the summer. It is also necessary to remove it into other vessels when the moon is increasing and under the horizon: but Sotion says that it is necessary to remove it at the *interlunium*, that is, on the first and second day before the moon becomes apparent to the human race. It is also proper, when we remove the wine from the casks into small

small vessels, to observe the rising of the stars; for the lees ferment at their rising, and particularly when the roses are in flower, and likewise when the vine is shooting. But men of prudence advise, and particularly Hesiod, when the cask is opened, to use the wine at the top of the cask, and that which is toward the bottom, and to keep the wine in the middle of the cask, as more powerful and more durable, and calculated for age; for the wine indeed toward the mouth of the cask, as usually exposed in some measure to the air, is more languid, having transpired; and that which is toward the bottom is soon turned, as being near the lees. But Hesiod thus expresses it:

“ From the cask’s top, and from its bottom, swirl;

“ The middle spare.”

But it is necessary that the person who removes wine into the jars should not fill them to the edges, but a little below the neck, that they may not be destroyed^a, but have vent. It is also necessary that the casks that are emptied should be immediately covered with brine, or with wood ashes, or with cimolia^o, or with potters earth.

VII.

^a *Αρχομένη δι πύθης και ληγομένη κορυφῇ*

Μισσοδι φιδισθαι.

^o Suffocated, in the Greek.

• A kind of chalk, from Cimolus, an island in the Egean Sea; Pliny, lib. iv. c. 12; and l. xxxv. 57.

VII.—CONCERNING THE TIME AND MODE OF TASTING WINE.

SOME indeed taste wines when the northern winds blow, for the wines then remain motionless and clear: but empiric wine-tryers taste wine rather when the south wind blows; for the south wind particularly sets the wine in motion, and it convinces one what quality it is of. It is not proper that a person should taste wine fasting, for the taste is dull, nor yet after drinking wine, nor after a hearty meal. The person that tastes ought to taste neither victuals that are stimulating nor too salt, nor such things as deprave^p his taste, but having eaten very sparingly and having well digested it. But it is proper to afford the buyers a taste when the north winds blow. Some wishing to have a good laugh, at the expence of the buyers, have a new jar, which they wash with very good, and old, and very well-flavoured wine, for the quality remains on it for a long time, so that one might think it to be the fragrance of wine lately poured in, and they thus deceive the persons that taste. Some innkeepers also, who are more cunning, lay cheese and nuts in the wine

^p Change, in the Greek.

wine-cellar so as to attract the persons that get in to eat of them, that the perfect sense of tasting may be falsified. These things have been written by me, not that we may practise them, but that we may not suffer from imposition. But the farmer ought to taste his wine often, the new and old; that the wine which is going to turn,¹ may not escape him.

VIII.—CONCERNING THE PROVING OF WINE AND MUST, IF IT HAS WATER.

It is necessary for the master often to trust wine or must to the curators or to the servants; it is also necessary that the buyer should prove if the wine is genuine. Some therefore throw an apple into the vessel, but it is better to throw in wild pears: some throw in a locust, and some a *cigale*,² and if these indeed swim the wine is genuine; but if they sink, it is diluted. Some also immerse in the wine a reed rubbed with oil, or papyrus, or a dried stalk of grass, or any dry twig;

¹ Φωγισί, to fly.

² The Greek name of this animal is τριλίξ, in French *cigale*. Some have given it the name of the *baulm cricket* in English.

³ In the sense of the Latin word *diluo*, which signifies to mix with water.

twig; having also rubbed them with oil, and having then wiped them, and taking out the reed, or any of the other things immersed, they make the proof; for if the wine is diluted, drops of water will stick on the oil. Some likewise, making a more simple experiment, pour the wine into a new pot that has had no moisture in it, and they hang it up during two days, for the pot will leak when water is mixed with it. Some also, heating the wine, pour it into a new pot, and they set it in the open air; if therefore it is diluted, it turns to vinegar. Some also pour the wine on what is called *titanos*, that is, a limestone; and if the wine is mixed with water, it will penetrate the stone; but if it is genuine, it will fix[†] the stone. Some pour the wine into a frying-pan having hot oil, and if it is mixed with water it will raise bubbles and make a noise, and it will fly up with elastic power. Some likewise having wetted a new sponge with oil, stop the mouth of the vessel and invert it, and if it[‡] is diluted it will run through the sponge. We also use the same proof with regard to oil.

† i. e. deprive it of volatility,

‡ It refers to wine.

IX.—TO SEPARATE WINE FROM WATER.

Pour liquid alum into the jar of wine, then stop the mouth of the jar with a sponge imbedded with oil, and having inclined it, suffer it to run out, and the water alone will run out.

X.—AT WHAT TIMES THE WINES ARE USUALLY TURNED.

ALL wine mostly turns acid about the setting of the Pleiades, and about the winter solstice, or when the vine blossoms, and about the summer solstice, and under the heat of the dog-star; and generally about all the accessions of heat and cold, or of much rain, or on account of much wind, or violent thunder, or at the season in which the roses blow, or from strong lightning.

XI.—THAT WINES MAY NOT BE TURNED, UNDER THUNDER AND LIGHTNING.

IRON set on the covers of the casks keeps off injury from thunder and lightning. But some lay on branches of laurel by way of prevention.

XII.

* *Kαθαίρει.*

† About the sixth of the ides of November.

‡ *Συνσημασία*, signs or indications.

**XII.—HOW ONE MAY PREVENT AND NOT SUFFER
THE WINES TO BE TURNED, BUT THAT THEY
MAY BE DURABLE.**

PARCHED salt thrown into the wine prevents it from turning; and it hinders it from fermenting more than what is necessary⁷, and from producing too great a head. Sweet almonds thrown into the black wines preserve them a long time. The dried grape, the kernel being taken away, macerated in must or sapa, and with sand, makes the wine rich and durable. But some prefer the grape that is spontaneously dried on the vine, and they use it alone without any other preparation. Gypsum, thrown in at the beginning, indeed makes the wine more stimulating, but in time the stimulating quality is sure to transpire; still the utility of the gypsum remains a long time; and fenugreek parched in the sun, if it is pounded and mixed with the wine, makes it keep, and does not suffer it to turn. Wines that are turned, being separated from their own lees that are vitiated, and poured over the lees of sound wine, will keep. But some having lighted torches, or having made iron red hot, extinguish them

⁷ Και αφροι πλεονα επιγινισθαι, and more froth to arise.

them in the must, and they do not permit the wine to turn sour. Some also, throwing the parched fruit of cedar and parched acorns^a into the wine, render it durable. Some, having burnt the stone denominated *porinos*^a, apply it to the wine. Others, having pounded and mixed the ashes from burnt shoots of the vine and fennel seed, mix them with the wine. Some also pour the wines that are turned into vessels that are recently pitched, and they remove them into another building; for, if indeed they have been hurt by heat, they lay them in cool places; but if by wet and cold, they remove them into warm and dry places. Others, having burnt the seed, or some of the substance of the oak, throw the ashes into the wine; and some, mixing milk and honey, pour them into the must. Some also, having burnt and well pounded oyster shells, throw them into the wine; others, having burnt the kernels of the olives, extinguish them with well-flavoured old *defrutum*, and afterwards pounding them they pour them into the wine. We shall make wine durable by applying the roots of the vine to the must. Potters clay also,

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thrown

^a *Kardas*, seeds of the oaks called *quercus* and *robur*.

^a Theophrastus says this stone was like Parian marble in colour and density, lib. *de Lapidibus*.

thrown in after the wines have fermented, fasts them, bearing along with it what is turbid down to the lees, and the more so if it is parched; and it makes the wine have a good flavour, for it is sweet: and^b the animals that feed on it in the winter live by it. Distilled oil, with sapa poured in, makes the wines more durable, and those that are weak more powerful. Black and white hel-lebore, moderately applied, fines wine, and it makes it durable, and it is of utility to them that use it. Black vetches moderately parched, and ground, and mixed, render wine lasting and diuretic. Sapa mixed with wine makes it durable. Wax mixed at the pitching makes wine have a harsher taste. Linseed mixed with sapa or must makes the wine durable. The flour of the white vetch preserves wine. Brutian^c pitch, that is, what is found at the bottom of jars, pounded and sifted into the wine, makes it durable. Resin of the pine, and particularly that of the

^b It is supposed that serpents fed on it. Virgil mentions a chalk of this kind.

..... *et nigris exesa chelydria*

Creta

Georg. ii. 214.

^c The Brutii inhabited that part of Italy now called Calabria, near Reggio.

the terebinthus, preserves wine. Scissile^d alum makes wine astringent and durable, and it stops it when it is turning acid.

XIII.—AN ADMIRABLE PREPARATION, MAKING WINES DURABLE, CALLED PANACEA.

Have these specifics in readiness: two ounces of aloe, two ounces of frankincense, two ounces of anemum, three ounces of melilot, one ounce of cassia, two ounces of spikenard, three ounces of the Indian leaf^e, two ounces of myrrh; having tied all these in a linen cloth, put one spoonful in each cask after the wine is poured into it, and after it has done working, and move it with the root of a reed during three days. Some indeed medicate their wines in this manner: they put in three scruples^f of crocus (for this makes the wine

^d This was the alum of the ancients. It is formed by the evaporation of water that has passed over beds of alum. Matth. v. 133.

^e Sometimes called *malabathrum*. The Greeks distinguished it by the name of *φύλλον*. Matth. i. 11.

^f The Greeks called a scruple *γρᾶμμα*, because it was $\frac{1}{144}$ of an ounce, as the word, literally taken, is $\frac{1}{144}$ of the Greek alphabet. The Romans seem to have copied the idea with much fidelity in the term which they use to express the same thing.

wine of a good colour), four scruples of male frankincense sifted (this makes the wine rather harsh), one pill of the Indian leaf (for it gives it a good flavour); mixing each of these when pounded and sifted, and having sifted them a second time, they put three spoonfuls in each amphora, when the wine no longer ferments, but is without motion: and observe this particularly in respect of all wines, that you are to medicate them when they are still^g. But others medicate their wines thus: they pound and sift equal quantities of all these, and pour them into the wine: cardamomum, Illyrian iris, cassia, spikenard, melilot, xylobalsamum^h, Alexandrian rush, costus, Celtic nard. Some indeed, boiling must and reducing it to a third part, mix it with the wine; some also throw in gypsum.

XIV.—AN EFFICACIOUS INSCRIPTION, THAT THE WINE MAY NOT TURN

THE wine cannot possibly turn, if you inscribe on the vessel or on the casks these pious words: “Tasteⁱ, and see that Jehovah is good;” and you will

^g i. e. when they are not fermenting.

^h See Matth. i. 18.

ⁱ This seems to be translated from these words:

טעמו וראו כִּן טוֹב יְהוָה

will do right if you inscribe this on an apple, and lay it in the wine.

XV.—INDICATION AND PREVIOUS TOKENS OF WINES THAT TURN, AND OF SUCH AS ARE DURABLE.

You are gently to remove the wine that has been poured into the cask, into another vessel, after some time, and you are to leave the lees in the cask, and you are to stop it carefully. You are then frequently to examine by smelling, whether the lees are at all turned, or small flies^k are produced, or any thing of this kind, for they are indications that the wine will be infected; but if nothing of the kind happens, entertain^l good hopes of the wine. Some indeed, having a reed straightway perforated, let it down to the lees at the bottom, and stopping the upper end of the reed with the middle finger, and after some time removing it, they by means of smelling attract the savour from the lees at the bottom; they then, by means of sucking, draw up some part of the lees, and they judge^m according to the quality of the

Q 3

lees,

^k Κανυσις; literally, gnats.

^l Have confidence in, is the Greek expression.

^m Conjecture, in the Greek.

less, of the future quality of the wine. Some, also having heated a little of the wine, and having afterwards cooled it, taste it, and they believe that, as it is found in taste, so will the rest of the wine be. But it is necessary that the experiment in tasting be made from the middle of the vessel. Others form their judgment from the covers of the vessels; for the cask being uncovered, they taste the moisture on the inside of the covers, and they judge that the wine will be of the same quality; for when the taste indeed is of a good vinous flavour, it is a sign that the wine is very good; but when it is watery, it is not to be depended on. Some likewise make a proof from the taste of the wine; for if it is of a rough taste from the beginning, it is a sign of soundness; but if it is of a faint taste, it is quite the contrary. One may also prove wine from the head^a that lies and swims on it. If the head is of a purple colour, spreads wide, and is mellow, the wine is the sounder; but if the head is glutinous, it is not good; and a head that is of a black or yellow colour, is an evident sign that the wine has no strength; but when it is white,

it

^a This in the Greek is *arbo*, that is, flower, or the fermenting substance, which indicates that the wine is advancing towards maturity. It was, by the Romans, called *flos vini*.

it is sound; and a head that resembles a spider's web, is a previous sign that it will soon turn sour. Again, if you see a serpent entwined around the vine at the time of the vintage, you are to expect that the wine will turn acid; but if the must is thick and glutinous, and you may prove this by touching it when the wine is trodden or put into the cask, the wine will be the sounder; but if it is thin and without strength, it will soon turn. The wines also that are rough in the must are the more durable, and toward the last they are better-flavoured; but the wines that are sweet and delicate at first, are of short duration: and the vessel that holds wine that is turning, seems to feel warm to the touch; but the vessel that contains durable wine is cold. If the wine indeed seems to taste warm in the spring, it will soon turn; but if it is cool, it will be durable. If the cover of the cask is found always dry, it indicates the wine to be very sound; but if moist, it is a sign of turning. If the wine has the savour of sharp mulsum, conclude that the cask is the cause of it, and it is then proper to remove it into another cask. Some thus prove whether wine is sound: having immersed their hands in the wine, they judge from the smell when they are dry, for the smell of the wine that is turned, seems to be more

acid. Some pour the wine into a vessel with a narrow mouth, and having stopped it very close, they set it in water during three days, and they then take it up and prove it. Some pour the wine into sand, and having percolated it, if it does not change, they judge it to be quite proof. Wines indeed usually turn at the solstices, and when the vine begins to bud; it is therefore necessary to prove them at those periods. Others prove wine thus: having made thin plates of lead, or of tin, or of brass, of the length and breadth of three fingers breadth, observing that they are very clean, they stick them to the cover of the cask with wax, and they lay the covers on, and after forty days they open the casks; and if they find the wines have a head, and they smell sweet and grateful, and all the plates clean, they conclude that the wine is sound; but if it is going to turn, you will find the plate of lead become white, and having flakes of the appearance of *ceruse*: if it is the tin, and the wine is going to turn, you will find a kind of sweat on the tin, that is black and of an acid taste; and if it is the plate of brass, and the wine is sound, you will find it clean and splendid as it was when set on; but if the wine is going to turn, you will find the plate of an unsavoury smell, and having bubbles on it. Some mix barley-meal

meal^a with it, and taste it when it has stood some time. Some throw parsley-seed, and bran^p, and laurel leaves, and shoots of the black vine, into the wine when boiling and extremely hot; and when it is cold, they taste it, and they prove it in this manner.

XVI.—HOW ONE MAY CURE WINE BEGINNING TO TURN SOUR.

HAVING filled a new pot with good water, and having carefully stopped it, let it down into the cask, then stop the cask, giving it a little vent, and after three days you will find the wine quite sound, but the water of a bad smell; do this until the wine is perfectly sound. But some pour a fiftieth part of goats milk into the wine, and cover it during five days; and they afterwards pour out the wine into another vessel, and cover it during ten days, and the wine does not turn.

XVII.—THAT WINE CARRIED OVER SEA MAY BE DURABLE.

HAVING percolated amurca through a cloth, and having boiled it to half its quantity, pour it with

^o ΑΛΦΙΤΟΝ.

^p Bran of barley, in the Greek.

with some Attic honey into^a the jar, before the wine is poured in; for it keeps thus a very long time.

**XVIII.—HOW YOU ARE TO MANAGE THE VINES,
THAT THEY MAY PRODUCE SWEET WINE.**

SOME render the wine sweet in Bithynia in this manner: they twist a fruit-bearing shoot thirty days before the vintage, and they take off all the leaves, that the sun may dry up all the moisture, and that it may make all the wine sweet, as we do when we boil it; but they twist the shoots for this reason, that they may keep the grapes from the moisture and nourishment of the vine, and that they may by no means receive any moisture from it. Some also, after they have freed^b the bunches from the leaves, and when the leaves begin to be wrinkled, gathering them successively, expose them to the sun, until they are all thoroughly^c dried; and taking them afterwards to be insolated in the same manner, they remove them into the press, and they let them remain the rest of the day and all the following

^a To the bottom of the jar, in the Greek.

^b Denudated, in the Greek.

^c i. e. become as the *vos passæ* of the Romans.

lasting night, and they tread them early in the morning.

XIX.—HOW WE ARE TO MAKE SWEET WINE FROM MUST.

If you wish to make the wine that is pressed[†] sweet, after pouring the must into the casks, suffer the casks to be without their covers three days, and then lay on the covers, not altogether close on the edges of the casks, but a little suspended, some sticks or reeds being laid to support them; but after the fifth day it is proper to lay the cover on close, being smeared with ashes mixed with water, small vent-holes having been left; and after the seventh day you are likewise to stop the vent-holes; but if you wish your wine to be sweeter, let your casks remain uncovered during five days, and after the fifth day lay the covers on, as it has been already mentioned.

XX.—TO MAKE WELL-FLAVOURED AND SWEET WINE.

HAVING gathered a few ripe myrtle berries, dry and pound them, and throw them into[‡] the
choenix,

[†] Trodden.

[‡] Εἰς τὴν καβὴν, into the cab, which was an eastern measure, equal to the Greek χοιμή, = $3\frac{1}{2}$ pints + 0.844 sol. inches.

choenix, and suffer them to remain during ten days, and then open and use them. You will also have well-flavoured wine, if you macerate fruit^v in water, and take it out, and pour the water into the wine; and the fruit will be fit^v to eat. Cenanthe also, especially from the arbus-tive vines, taken and applied in the blowing season, makes wine well-flavoured; and the cask fumigated with wax affords a good savour. We shall likewise make wine of a better flavour by rubbing the edges of the cask with leaves of the pine and of the cypress, and by stirring the must. But if you wish the wine to have the flavour of suffumigation, either of fruit, or of any thing else, put in one of the fore-mentioned ingredients before you pour in the wine, and having tied it, let it remain as long as it is sound and its smell is not changed; then remove it, and pour in the wine, and having stopped it, then use it. These things likewise produce a good flavour: abrotonum, bitter almonds, potters clay, the leaves of asarum^x, the roots of aspalathus, the flowers of asparagus, the saw-dust of cedar, the flour of fenugreek. It is necessary to suspend
some

^v The original mentions Asiatic fruit.

^v Pleasant, in the Greek.

^x In Spanish *asarabacara*, Matth. i. 9.

some of these in small baskets, and some tied in cloths, high in the vessel containing the wine, so that they may not touch it; and when they have imparted their flavour, they are all to be taken away, before they are corrupted and changed.

XXI.—TO MAKE WHITE WINE BLACK, AND BLACK WINE WHITE.

Mix eight drams of drossy salt with ten cotylæ of black wine. The serum of milk poured into wine has the same effect: and if any one pours the ashes of sprays of the white vine, when burnt, into a vessel, and having stirred them, lets them remain in the vessel during forty days, the wine will be white; and the white wine will be black, when ashes of the sprays of the black vine are poured in.

XXII.—TO FINE WINE.

Pour the whites of three eggs^z into a vessel, and stir them until they froth, and throw in some white

^γ Ἄλος, *ευκαρῶς*.

^z Maimonides says that the nature of eggs is such, that when poured into things that are turbid, they fine them, and separate the gross from the subtile parts. *Schabbeth*, c. xx. s. 2.

white salt, and a proportionable quantity of wine, and work it until it is very white; then fill the vessel with the wine, and do this to every jar, and set it by.

XXIII.—TO MAKE WINE STRONG FOR MIXING WITH WATER, SO THAT A LITTLE OF IT, WHEN TAKEN, MAY BE SUFFICIENT FOR MANY PERSONS.

GRATE the dry roots of althæa^a into the wine, and when you have stirred it, use it.

XXIV.—TO MAKE NEW WINE APPEAR OLD.

HAVING mixed a cyathus^b of bitter almonds, of absinthium, of the leaves of the fructiferous pine, after they have been dried and pounded, to an amphora, you will make wines seem old, and you will make them durable. You will also make wines seem old if you take two jars, that have been filled with old wine, and break off their handles and edges, and the extremities of their bottoms (which do not partake of the savour of the

^a Matth. iii. 146.

^b The Attic measure is $\frac{1}{12}$ of 0.366 solid inches of an English pint, wine measure.

the wine), and throw them away; and having pounded and sifted the other part, if necessary, with the old lees of the wine, throw in half a modius^c into an amphora, and stir the wine, and having stopped^d it, let it remain fifteen days, then open and use it, and you will think the wine ten years old: and when the wine is consumed, pour the lees into a fresh pot, and having stopped, and burnt and sifted them, use them again in the same manner; for the use of these will be sufficient, instead of all the fore-mentioned aromatic ingredients. But some make wines seem old in this manner: having pounded and tied one ounce of melilot, three ounces of glychiriza^e, the same quantity of celtic nard, two ounces of hepatic aloes, they throw them into the wine, and they then use it.

XXV.—THAT WINE MAY HAVE NO YEAST.

BESPRINKLE dried oenanthe over the wine, or mix flour of orobus with the wine; and when the
flower

^c The Roman modius was a measure for things, ^{dry} $\frac{1}{2}$ one peck + 7.68 solid inches, in English corn measure.

^d Having smeared it all round, in the Greek.

^e Liquorice, or the sweet root.

flower^f and the meal have subsided, pour the wine into another vessel.

XXVI.—TO AMEND THE WATERY TASTE OF WINE.

You are to pour in four cotylæ of garum^g and the leaves of the pomegranate, and they will remedy the watery taste. And you will cure the unpleasant savour thus : you are to put into the cask rich lighted torches ; but some having stopped a vessel containing water, lay it in the cask, and after the third day the wine will be fine, but the water will have a bad smell. Some likewise put in burnt shells : some let down hot barley bread in a basket ; others throw in the seed and leaves of parsley ; others mix the whey of new-made cheese with it ; others apply the^h willow-tree, and remove every thing that is faulty in the wine.

XXVII.

^f i. e. the ænanthe.

^g It was made from the fish called by the Greeks γαρός, its entrails being macerated and dissolved in salt. It was afterwards made from the fish called *scomber*. Pliny, lib. xxxi. cap. 7.

^h The Greek says, the wood of the willow.

XXVII.—TO CURE WINE HURT BY ANY NOXIOUS
ANIMAL.

Hot bread, or an iron ring thrown in, takes away the poison.

XXVIII.—TO STOP THE FERMENTATION OF
WINES THAT ARE FECULENT AND TURBID.

SOME pour a cotyla of amurca, boiled to a third part of its quantity, into every *metretes*¹, and the fermentation is speedily stopped.

XXIX.—TO MAKE WINE APPEAR TURBID.

HAVING expressed the juice of radishes, pour it into the wine.

XXX.—THAT A PERSON DRINKING WINE MAY
NOT SMELL OF IT.

CHEW some Iris^k Troglodites.

¹ The Attic *metretres*, = 10 gallons 2 pints, 19.626 sol. inch.

^k Supposed to be the African Iris, which Pliny says was very large, and of the most bitter taste, lib. xxi.

XXXI.—THAT A PERSON DRINKING MUCH
WINE MAY NOT BE INEBRIATED.

HAVING roasted the lights of a goat, eat them, or, when fasting, eat five or seven bitter almonds, or eat raw cabbage, and you will not be inebriated. A person that drinks likewise will not be in liquor, if he is crowned with *chamæpitys*¹; or if, in drinking the first cup, he repeats this verse of Homer :

“ Thrice thunder’d Jupiter from Ida’s heights.”

XXXII.—HOW ANY ONE WILL ABSTAIN FROM
HAVING TOO GREAT A DESIRE FOR WINE.

COLLECT the moisture that runs from the shoots after they are cut, and give it the person in liquor in his cups, unknown to him, and he will abstain from having too great a desire for wine.

XXXIII.—TO MAKE PERSONS IN LIQUOR SOBER.

VINEGAR copiously drunk, and radishes eaten, and pastryⁿ made with honey, and sweet^o cakes,
make

¹ Sometimes called *Aiuga*. Matth. iii. 157.

ⁿ Ilias, e, v. 170.

ⁿ Plutarch says the same thing, Symp. iii. 7.

^o These were called by the Romans *placentæ*.

make persons in liquor sober; and so do disquisitions and relations on the subject of old stories, and chaplets^p of various flowers set on the person's head.

XXXIV.—NOT ONLY WINE, BUT OTHER THINGS, MAKE THE PERSONS THAT DRINK THEM INEBRIATED.

WINE indeed is the first of the things that are drunk which makes persons inebriated; secondly, water, although it may seem a paradox; thirdly, drink^q made from wheat and barley, which the barbarians mostly use; fourthly, drink made from rye and oats; and what is made from millet and panic intoxicates. Old men, and all that are of a cold habit, are easily intoxicated; but women are less liable to intoxication than men on account of their constitution, yet they get in liquor by the act of drinking.

R 2.

XXXV.

^p Galen says the same thing, lib. ii. c. 2.

^q Called *cremor hordeaceus* and *cerevisia*, and by the Greeks *οἶνος κριθινός*, used in Gaul, Spain, and Britain, and in Egypt; Pliny, lib. xiv. sect. ult. Herodotus says, that the Egyptians used wine made from barley, l. ii. Dioscorides calls this liquor *κριθαί*, lib. ii. c. 110.

XXXV.—HOW WINE IS MADE WITHOUT GRAPES.

THE fresh fruit of the myrtle and of the cherry ground and pressed makes wine. Pomegranates likewise cleanly pressed, the pips in the middle being taken away, make wine. Some also make wine from green figs in this manner: they lay figs in a wine-jar till it is half full; they then fill the vessel with clean water, and they often taste it; and when the flavour is vinous, they lay it up for use.

XXXVI.—AN INFALLIBLE PREPARATION OF WINE THAT PRESERVES HEALTH TO OLD-AGE.

FOUR drams of the best iris, a tryblum^r of fennel-seed, the same quantity of flour, one dram of pepper, two drams of myrrh *troglodites*^r, one dram of *seseli*^r, half a dram of *meon*^a; having pounded

^r *Troglos* was a vessel made in the form of a dish. It is possible it contained some inferior quantity three times.

^a What was called by this name by Dioscorides is now supposed to be the *benjovinum*. Diosc. lib. i. 77.

^r The Greek, Latin, and Italian name of this plant is the same; Matth. iii. 53.

^a It now goes under the name of *meu*; Matth. i. 3.

pounded these, pour over them a sufficient quantity of well-flavoured white wine, and mix them; and having reduced them into a mass, tie them in a thick cloth, and lay them in a vessel, and pour some very good wine over them; and having stopped it, after four days open it, and drink a cup fasting. If a person uses this always, he remains in good health. But it is better if they are put into must.

XXXVII.—CONCERNING PERCOLATING WINES.

LAY the strainer^v in sheer brine, or in sea-water mixed with river-water, during two days, and afterward wash it thoroughly with wine; and indeed, when you want it, press it; then rub the edges of the strainer with almonds, or with pounded nuts^v. But some mix with the wines that are percolated anise, or they apply to them a lighted torch, or gypsum, or sapa, or honey, or the lees of good wine, or the meal of orobus.

^v The part through which the liquor was percolated, probably.

^v Καρυς, walnuts.

BOOK VIII.

HYPOTHESIS.

These things are in this Book, being indeed the Eighth of the select Precepts of Agriculture, and containing the different preparations of wines and of other liquors*, and the inferior preparations of all kinds of vinegar.

I.—PREPARATION OF SALUTARY WINES.

THE means of preserving and preparing salutary wines that cure different diseases, which many of the ancients recommend from experience. The preparation of them has nothing of the nauseous property of physic, but it is very simple, as from roses, or from anethum, or from absinthium, or from pulegium, and from things of this kind. But it is necessary to pound each of the fore-mentioned sorts, and to tie them in a cloth, and to put them into the wine, in the way hereafter recommended.

II.

* Καὶ πρὶν γεγενηται. *Προγεγενητα* were liquors which were drunk before meals.

II.—RHODITES.

HAVING tied together a due proportion of dry mountain roses, and anisum, crocus, and honey, put them into wine. This wine is good for complaints in the stomach, and in pleuritic cases.

III.—ANETHITES.

THE seed of anethum is to be put into a cloth, and then to remain in wine; and this wine is soporific, it is diuretic, and it promotes digestion.

IV.—ANISITES.

THE seed of anisum put into the wine stops the difficulty of making water, and it is of utility to the bowels.

V.—APITES.

WINE having pears put into it astringes² the belly.

R 4

VI.

¹ The seed is here, and in many other parts of this collection, called *καρπος*.

² *Κοιλιαν ισησιν*; literally, "causes the belly to rest." *Κοιλια* here signifies the belly, relative to the intestinal discharge, as

VI.—ASABITES.

THIS wine is diuretic; it strengthens persons that are dropsical, that have the jaundice, diseases of the liver, the sciatica, and that have a tertian
ague;

Hippocrates uses it. *Alvus* is used by Celsus, in the same sense. The word *erow* in this place assumes a meaning which the second and fourth, and other conjugations in Arabic express. The Hebrew grammarians give them the appellations of *hiphil* and *hophal*. Although the Greeks and Romans had no regular modification to convey this causal sense, it is very often understood in their verbs. The verbs *γινωσκω* and *γινωσκει* have this sense and a change of form. The Latin words *cresco*, *excito*; *cado*, *cado*; *sto*, *statuo*, with many others, convey this meaning. The word *ruit* has it in the following passage:

Quid dicam, jacto qui semine cominus arva

Insequitur, cumulosque ruit male pinguis arena?

Virg. Georg. i. 105.

The Spanish language, which has reserved much of the construction and spirit of the Latin, and which has received a supply of many Arabic words, often makes use of this oriental mode of expression in its verbs; as, *abonar*, *acariciar*, *querrellar*, *apresurarse*, *obligar*, *enojar*, *calentar*, *limpiar*, *chular*, and in many and many more. Other examples of this kind might be adduced from the living languages of Europe; and the English verbs afford some instances of this eastern mode of expression. *To lay*, *to cause to lie*; *to fell*, *to cause to fall*; *to raise*, *to rise*; *to set*, *to sit*; *to suckle*, *to suck*. *To learn*, and other verbs, use it without change of form.

ague; and it cures diseases, the indication of which is a rigor^a.

VII.—GLECHONITES.

It is proper to boil the pulegium in wine till a third part is left. This wine is salutary against the poison of serpents^b, and it is useful against the winter's cold.

VIII.—DAPHNITES.

THIS wine is very warm; it is diuretic, it is useful in coughs, in diseases of the thorax, in pains^c in the intestines: and it is of service to persons in years, and it is proper against the poison of serpents, and against the ear-ache; and it is of use to women in the hysterics.

IX.—MARATHRITES.^d

THIS wine promotes an appetite, strengthens the stomach, and it is diuretic.

X.

^a i. e. chilliness.

^b Venemous animals of the creeping class, in conformity to the etymology of the word in the Greek and Roman languages.

^c Σπασμς.

^d Fennel wine.

X.—CONYZITES.

THIS wine is proper for persons in the jaundice, and in complaints of the stomach; and it is of use against the bite of serpents.

XI.—OMPHACITES.

THIS wine is good for the stomach; it is proper for persons that are paralytic, that have a torpor^e, that are tremulous^f, that have a vertigo^g, that have diseases of the kidneys, and that have the colic, and for pestilential diseases.

XII.—PETROSELINITES.

THIS wine strengthens the stomach, causing eructation, and exciting an appetite; it is diuretic, and very soporific.

XIII.

- A numbness, or deficient feeling and motion.

Tremors, in some cases, in the modern practice of physic, require the same treatment as palsies.

Called *scotomatia*, when the eyes are darkened, or so affected, as if several colours were before them.

XIII.—PEGANITES.

THIS wine is warm and an alexipharmic¹ for deleterious medicaments, and for poisonous reptiles.

XIV.—TELITES.

THIS wine (the fenugreek being pounded and put into the wine) is particularly adapted to complaints of the liver.

XV.—HYSSOPITES.

THIS wine purges the thorax¹; being warm, it promotes digestion, and it mollifies the abdominal viscera.

XVI.—SELENITES.

THROW the pounded seed of parsley into the wine, and it becomes diuretic, and excites an appetite; and it is of service in nervous and hypochondriacal diseases.

XVII.

¹ What repels poison by forcing it through the pores.

² The breast, which is divided into anterior, posterior, and lateral.

XVII.—WINE FROM APPLES.

LAY some very well-flavoured quinces in jars, and pour wine on them; then having stopped them, let them remain during three days, and on the fourth day use them.

XVIII.—PREPARATION OF CATHARTIC WINE.

WHEN the trenches are dug, pound the roots of black hellebore, and having cleared the roots of the vine, throw the pounded hellebore over them, and then adjust them.

XIX.—WINE CALCULATED TO IMPROVE A WOMAN'S MILK, AND KEEPING HER FROM FALLING INTO ANY ILLNESS.

GATHER some thyme while it is in blossom; and having dried it, pound it; then throw four choenices into a jar, pouring over it a proportionate¹ quantity of white wine, and stop the jar during forty days.

XX.

¹ A measure, in the Greek.

**XX.—WINE FOR THE DYSENTERY AND FLUX
OF THE BELLY.**

TAKE thirty pomegranates before they are ripe, and bruise them; then lay them in a jar, and pour three *chooi*¹ of rough black wine over them, and use them after thirty days.

XXI.—CONCERNING ABSINTHITES.

POUND eight drams of absinthium, and particularly of the Pontic^m, and having tied it in a cloth, that is not of too dense a texture, lay it in a jarⁿ. Some indeed lay in half of the absinthium, and many mix cassia with it. When therefore you lay the cloth in the jar, pour in the must till you fill it, affording it one vent-hole, that it may not ferment to too great a degree. Prepare as many jars as you wish in the same manner; and use the absinthites for diseases of the hypochondria

¹ The Attic *χω* was 6 pints 25.698 sol. inches. It differed but little from the Roman *congius*.

ⁿ This absinthium is mentioned by Cato, clix. and by Vegetius, iii. 28, 7.

ⁿ In an amphora, in the Greek.

chondria and of the liver, and for crudities*, and for pains in the stomach. It also throws out noxious animals bred in the intestines.

XXII.—THE MAKING OF AMINEAN WINE.

SOME indeed pouring wines of Aminean flavour into a vessel which had Italian wine, bury it in a place under the open air; and some throw in a few bitter almonds, and a little of the Indian leaf, and a little defrutum: and others put into seven amphoræ two drams of hepatic aloes and of cyperus², or of other aloes, three drams of amomum³, four drams of costus, four drams of the Indian leaf, nine drams of melilot, two drams of Indian nard, three drams of cinnamon wood. Some also add four drams of each of these, of myrrh, cassia, crocus. Some use the sweet-scented calamus instead of myrrh.

XXIII.

* Indigested substances in the stomach.

² The French call it *souchet*, the English *galangale*.

³ *Amomum*; in Italian *amomo*. Many plants have this name. Galen says of the true *amomum*: *Amomum acoro similem facultatem obtinet, nisi quod acorum siccius sit, majore autem concoquendi facultate amomum*; lib. vi. Matthioli, p. 53.

XXIII.—PREPARATION OF THASIAN' WINE.

WE insolate the grapes when ripe, laying the bunches in pairs during five days, and on the sixth day at noon we take them up warm, and immerse them in must and sea-water boiled to half its quantity; and we take them up and lay them in the press; then having trodden them the following night and day, we pour the liquor into vessels; and when it has fermented and is fined, we pour a twenty-fifth part of sapa into it; and after the vernal equinox we rack it into proportionate vessels.

XXIV.—PREPARATION OF COAN WINE.

SOME indeed boil three parts of must and one of sea-water into a third of the quantity; but others mix with two measures of white wine one cotyla of salt, three cotylæ of sapa, one cotyla of must, one cotyla of flour of orobus, one hundred drams of melilot, sixteen drams of Celtic nard.

XXV.

* Pliny mentions this wine, lib. xiv. 7.

XXV.—CONCERNING ŒNOMELI.

Put some Attic honey into an earthen pot,³ and set it on hot ashes, that it may be clarified;⁴ and after the honey has been warmed, pour four sextarii of wine to a sextarius of honey, and then pour the œnomeli into vessels that are well pitched; and having pounded twelve scruples of dry costus, and having tied it in a cloth, suspend it in the œnomeli; and having stopped, set it in a room up-stairs. But some having pounded twelve scruples of the Indian leaf, mix it with the œnomeli, and they find it good beyond expectation after fifteen days; and when it is old, it is incomparable. Others indeed make œnomeli thus: they mix six scruples of myrrh, twelve scruples of cassia, two scruples of costus, four scruples of nard, four scruples of pepper, with twenty-four sextarii of Attic honey; and they set it in the sun at the rising of the dog-star during forty days. Some call this nectar.

XXVI.—ŒNOMELI FROM MUST.

Let the must stand until it has subsided to a certain degree, and mix one sextarius of Attic honey

* "That froth may arise," in the Greek.

honey with ten sextarii of must; and having poured it into the jar, and having secured it with gypsum, set it in the shade. But it is proper to know that the œnomeli from must is flatulent and improper for the stomach, but it is good for the bowels.

XXVII.—PREPARATION OF HYDROMEL.

HAVING cut thirty-two of the best apples small with a reed, and having taken out the pips, put them into eight sextarii of the best honey; and having suffered them to remain eight months, mix with them twelve sextarii of rain water, that has been kept a considerable time, and insolate them under the heat of the Dog-star, keeping out the rain and dew. Others, acting more judiciously, prepare hydromel thus: having pounded the best apples that are come to maturity, and having expressed four sextarii of the juice, and having mixed eight sextarii of the best honey, that has been skimmed, and twelve sextarii of rain water, and having insolated and sufficiently boiled^t it, they use it. But some boil
it

^t When the ingredients are united, I use the singular number.

it in a double^v pot, so that it may soethe more from the heat of the water, and not immediately from the fire, as it is the custom in Spain.^v

XXVIII.—ANOTHER PREPARATION OF HYDROMEL.

TAKE some stale^v rain water, or what has been boiled away to a third part, mix with it a sufficient quantity of honey, and having poured it into a vessel, set it in the shade during ten days, leaving a hole for vent, and so use it; but if it were old, it would be better. Empirics also use this in diseases,^x knowing that it is compounded of water and honey only. Others indeed mix snow only with honey; and having well wrought it,

^v *Διπλὸν ὑψοῦν*, i. e. in a small pot, placed in one that was more capacious, with water in it. This process is in modern times called *balneum marie*.

^v The different readings in this place have subjected the passage to some ambiguity.

^v *Cum aqua pluvia cessat putrescere, tum dulcedinem acquirit.* Plin. xiv, 17.

^x *Εν ταῖς ἀσθενείαις*, in infirmities. *Hydromeli quoque ex ambre puro cum melle temperebatur quondam, quod daretur appetentibus vini ægris, veluti innocentiore potu.* Plin. xxxi. 6.

it, they lay it by, and it is a medecine used in raging fevers¹; and they call it *chionomeli*.²

XXIX.—RHODOMELITES.

HAVING pounded some good roses (mountain roses, if they are to be procured) judiciously³ gathered, and having squeezed them in the press, and having poured two sextarii of the juice, mix a sextarius of honey with it. Having skimmed the honey, pour it into the juice of the roses, and having poured it into a vessel, mix⁴ it well, and set it in a place that is dry.

XXX.—PREPARATION OF PARSLEY WINE.

TWELVE scruples of parsley seed (some put in sixteen scruples), six scruples of the seed or of the green leaves of rue, one sextarius of skimmed honey, five sextarii of wine; having mixed all these, set them by during fifteen days.

s 2

XXXI.

¹ Burning.

² So called, because mixed with snow.

³ *Εξουχισμένα*, taken with those parts of the petals that were fixed in the empalement.

⁴ *Αναταράξει* *ις* *αυτῶν*. The Greek expression implies the mixture was effected by briskly moving the composition upward.

XXXI.—PREPARATION OF CONDITUM.*

LET eight scruples of pepper washed and dried, and carefully pounded, one sextarius of Attic honey, and four or five sextarii of old white wine, be mixed.

XXXII.—PREPARATION OF THE BEST SAPA.^d

IF you boil and skim eight sextarii of the best must, and a hundred sextarii of the best wine, to a third part, you will make it excellent.

XXXIII.—PREPARATION OF DIFFERENT SORTS OF VINEGAR, AND HOW ONE MAY MAKE WINE INTO VINEGAR.

TAKE and pound beet-root and lay it in the wine, and it will be vinegar in three hours. But if you wish to make^e it change a second time, put some cabbage-root into it.

XXXIV.

* Wine impregnated with aromatics and honey.

^d The *εψημα* of the Greeks.

^e *Αποκαταστησαι* signifies to bring the composition from its last state; it does not imply into its first state, as the Latin word *restituere* in the translation does. The Latin and English languages have not correspondent terms to express the idea.

XXXIV.—VINEGAR MADE WITHOUT WINE.

Put some tender peaches in a jar, and having parched some barley, sprinkle it over them, and suffer it to putrify; then percolate and use it. You are also to make vinegar without wine thus: lay some tender figs in a jar, and parched barley, and the insides of citrons, and stir them often; and when they are properly compounded, percolate and use it. You will make vinegar without wine thus: boil gypsum and sea-water; having then mixed it with river-water, when it has been percolated, use it.

XXXV.—VINEGAR CALCULATED FOR DIGESTION AND HEALTH.

Put eight drams of squill and one sextarius of vinegar in a vessel, and a due quantity of pepper, and of mint, and of cassia, and of ripe berries of the juniper, and after some time use it.

XXXVI.—PREPARATION OF SWEET VINEGAR.

Take a jar of very sharp vinegar, and having mixed with it an equal quantity of good must,

that has been trodden,^f stop it with pitch, and having suffered it to lie thirty days, use it. But some make sweet vinegar thus: they boil one measure of must as it runs from the treading, with two measures of vinegar, until the third part be boiled away. Others boil two measures of must and a measure of vinegar, with three measures of river-water, previously boiled, until the third part of the whole be boiled away, and two thirds remain.

XXXVII.—PREPARATION OF SHARP VINEGAR,

DRY the grape kernels during two days, and lay them in must with a few sour grapes, and after the seventh day use it; or throw in pyrethrum^g, and it will be sour. You will also make it sour if you take a fourth or fifth part of the vinegar, and heat it over the fire, and add it to the remainder, and set it in the sun during eight days. The stale roots of agrostis thrown in, and dried grapes, and the pounded leaves of the wild pear,

^f This was sweeter than what came from the press, because the bruised grape-stones did not contribute to give it sharpness.

^g Pellitory of Spain. The Greek name seems to allude to the fiery quality of the root of the plant,

pear, and bramble roots, and milk whey, will make vinegar very^a sharp and pleasant. The hot cinders also of burnt oak, and a decoction of erebintai,¹ and burning hot shells, thrown in, make vinegar sharp.

XXXVIII.—THAT VINEGAR MAY KEEP SOUR.

HAVING mixed beans with an acid citron, throw them into the vessel.

XXXIX.—TO MAKE PEPPER VINEGAR.

PUT some whole pepper in a cloth, and having suspended it in the vinegar eight days, use it.

XL.—PROOF OF VINEGAR, WHETHER IT IS MIXED WITH WATER.

THROW some nitre into the vinegar; and if it swells, as if boiling, conclude that it is diluted.

XLI.—HOW TO MAKE A DOUBLE QUANTITY OF VINEGAR.

TAKE a certain measure of vinegar, as for example, an Attic measure; add to it one Attic

s 4

measure

^a Δεινότερον.

¹ Vetches.

measure of sea-water boiled to half its original quantity, and having mixed them, lay them by in a vessel. Some indeed having macerated and percolated barley, mix one Attic measure of the liquor with one Attic measure of vinegar, and they stir them together; and having thrown in a sufficient quantity of parched salt quite hot, they stop the vessel, and they suffer it to remain twenty days. Some also throw figs moistened and putrified on the trees into water, and permitting them to putrify together, they make vinegar.

XLII.—TO MAKE SQUILL^k VINEGAR.

POUR into a jar thirty-six^l sextarii of the best and sharpest vinegar, and take the inside of the^m white

^k This has the credit of having been made by Pythagoras; and when he began to make use of it, he was fifty years old, and his life was prolonged to a hundred and seventeen years; and he is said never to have been assailed by ill health.—Galen. op. l. iii. c. 249.

^l I have used this term in preference to the Greek *ξίστα*, because it is more known. The *sextarius* was more capacious than the *ξίστα* 1.353 sol. inch. It was the sixth part of the Roman *congius*, as the *ξίστα* was the sixth part of the Attic *χους*.

^m The Greek says, of the peel of the white squill.

white squill cut into small pieces, and dried in the sun during thirty days ; macerate it in the vinegar during twelve days ; then take the vinegar and set it by, and use it when you wish ; for squill vinegar will be no less useful than the squill wine.

BOOK IX.

HYPOTHESIS.

These things are contained in this Book, being the Ninth indeed concerning the select Precepts of Agriculture, and comprising every method concerning the planting and care of the olives, and the making of oil from immature olives ; and every other care and management in relation to the oil ; and concerning the various modes of preserving olives.

I.—CONCERNING OLIVES.

THEY say that the olive was thus produced : all the earth being in the beginning covered with water, and when it first appeared at Athens, Minerva and Neptune being enamoured with the situation, contended to build a city with their name. But Jupiter, wishing to put an end to the contest between them, says, “ Whoever bestows the most useful gift on the city, let him have it.” Neptune therefore supplied it with ports and naval^m repositories ; and Minerva raised an olive in the citadel, flourishing and fruitful ; and being crowned with it, and by all admired, she obtained
the

^m Ναυπηγικ, with docks.

the victory, and they called the city Athens, after her name. Neptune thus being overcome, betook himself into his usual limits: from which circumstance the arbitrators set a chaplet of the wild olive on the heads of those who overcome in difficult contests. The inscribing of the word *Athena* on the leaf of the olive, and fixing the leaf on the head with a thread, has indeed been useful, and it has, as a charm, cured the head-ache.

II.—CONCERNING THE PLANTING AND THE CARE OF OLIVES, AND THAT A DUE ATTENTION TO THESE IS OF THE GREATEST ADVANTAGE.

THE return arising from the olive-tree being very necessary (for no other produce can be thus preserved during a length of time), it is requisite that they who are employed in agriculture should bestow the greatest attention on the olive: for the produce from the olive has not only infallible and certain returns; but the fruit of the olive is also of the greatest utility to all the ails of life. The leaves of olives being turned, also announce the summer solstice, as does the lime, and the elm, and the white poplar. Judge also that the olive is fruitful, if it does not produce fruit at the sides, but at the top of the shoot. But the

the olive being pure, ought to have them that gather it chaste; and they ought to swear that they come from their own wife's, not from another's bed; for it will thus produce a great abundance of fruit for the time to come. They say also, that in Anazarbe^a of Cilicia, chaste boys cultivate the olive, and for this reason, that the olive is there very fruitful.

III.—CONCERNING AIR SUITABLE TO OLIVES, AND THE FORM OF THE GROUND.

A WARM and dry air is adapted to olives; and one may see this in Libya and Cilicia, and their olives. But the form of the ground, when inclined and high, contributes to the suitability of the air; for this, in situations of this kind, because the burning heat of the sun coming from above is cooled by the winds, makes the best oil, and that which is prepared and called the crude^b wrought oil; but the olives in champagne situations being indeed less moved by the winds, and more powerfully warmed by the sun lying on them,

^a A town of Cilicia, which gave birth to Dioscorides.

^b *Ἰμωτερός*. It was made of olives before they were ripe.
Το Ἰμωτερός ὃ καὶ ὀμφακινὸν καλεῖται. Galen. lib. 3.

them, produce the thick oil. On the whole then it is to be observed, that the winds give animation, not only to plants, but to all things, as vehement and impetuous winds are unpropitious to all things; but they mostly contribute indeed to the thriving of all plants, and particularly to that of the olive. You will therefore find those plants of the olives peculiarly flourishing, to which the free air has access, the distances between the plants being considerable, through which the wind can find its way in due proportion. For this reason then we have said, that inclined and high situations are eminently adapted to the olive, because they always receive a temperate wind, which injures nothing, but approaches each tree impartially, and it cherishes and promotes the growth of the plant.

IV.—CONCERNING THE TIME OF PLANTING OLIVES, AND IN WHAT KIND OF GROUND YOU ARE TO PLANT THEM.

You are to plant olives from the setting of the Hyades to the winter solstice, that is, from the fifteenth of the month of November, to the twentieth of the month of December. You are likewise to plant the olive in the spring; for the two
seasons

seasons resemble each other in respect of moisture and cold; for the autumn indeed keeps the ground warm from the heat of the sun, and it preserves its moisture from the autumnal showers; and the spring indeed possesses moisture from the preceding showers, and it assumes heat from the approach of the sun. The moist soil produces more flourishing and more rich olive-trees; for which reason you are to prefer this soil: and the next to this, is the white potters clay; the third is the hard potters clay. But we do not recommend the deep soil, nor the red, for being hot it kills the plants with heat; and you are more particularly to avoid the soil that is dug deep, for it produces poor and watery fruit; but light land is suitable, and Attica bears testimony to this.

V.—CONCERNING A NURSERY.

INDEED the setting of the plants already mentioned in their own ground is a more compendious way, without the delay arising from the taking of the plants up from the nurseries. But as plants removed from the nurseries possess more infallible principles of vegetation, we will shew the mode of making nurseries. It is necessary

sary then, as we 'have' often already mentioned, that the nursery should be always equal to the soil to be planted, not only in quality and form, but in the quality of the air also, that the plant that is to be set in it may not suffer from its novelty. You are then to take into the nurseries shoots from the young and fruitful olives of a proper thickness, not such as have sprung from the trunk, but above, from the shoots for cutting and the young branches. Let the measure also be a cubit, and let not the bark be lacerated in the cutting; for it is proper to observe this most correctly. You are also to trim the wound on every side with a sharp knife, keeping the plant close cut and whole; but let the lower end be smeared with cow-dung mixed with ashes; and we are to set it in the ground, so that it may protrude four fingers breadth, and we are then to excavate the trench, as it has been already mentioned, for the reception of the showers. It is also proper, as we have said, previously to observe, that the cutting may not be set with its head downward; and we are to fix a reed that

the

* II. 48.

* *Ακραιον και υλοκληρον*. The first word means, that the shoot ought not to have any superfluous part of the wood or bark of the wood from which it was taken.

* See x. 2.

the workmen may know the plant[†]; and it is necessary to stir the plants in the nurseries every month, for seven months. In the space of three years, this training in the nursery may be of utility; but the fourth year you are to take off the superfluous branches, and thus you are to remove the plants into the ground that is to be set, carrying with the plants a portion of their own native soil. The mode indeed of planting olives also by means of cuttings is useful. But some, setting in the nurseries large[‡] shoots taken from the lowest roots, which by the Syrians are called *gorphia*[‡], when they see them fit for removing, transplant them. But many setting them, not in nurseries, but in their own soil[‡], have not missed their aim. But it is better to set such things mostly in nurseries; for, when diligently watered in them, they quickly shoot, and they are easily transplanted.

VI.

† The sight of the plant, in the Greek.

‡ *κυλα*.

‡ From the eastern word *גרף*, in the infinitive, *to pluck*; or from the Arabic word *جرف*, which signifies to take away wholly, or, as it is expressed in English, root and branch.

‡ Have not thoroughly erred, is the Greek expression.

**VI.—CONCERNING TRENCHES FOR THE PLANT-
ING OF THE OLIVES.**

WHEN the planting of the olive takes place, it is proper to clear the places in which it is to be made, and to take away every thing of heterogeneous quality, and to throw up a wall or a hedge. But it is proper, and peculiarly so, to dig the trenches the year before planting, that the soil may be rendered more friable by the sun, and by the breezes and the showers, and that the plants may throw out roots. But if we are in a hurry to plant, we are to burn at the bottoms of the trenches two months before, or at least one, dead shoots and reeds, and such things as are easily burnt, during many days together. The trench indeed ought to be three cubits deep, or not less than two and a half. Let the trenches also be fifty cubits distant from each other, that the stems of the trees may be well aired, and that the intermediate space may be sown. But some thinking the mode of sowing beneath them, make the plantation thick, but so that the plants may not be shaded one by another.

**VII.—OF WHAT SORT THE OLIVE PLANTS TO BE
SET OUGHT TO BE.**

THE olive plants ought to come from suitable situations, and from young trees that bear yearly; having stems of due thickness, or more than commonly thick; and they ought to be smooth and straight.

VIII.—TO MAKE AN OLIVE-TREE FERTILE.

BORE the stem quite through with an auger, and taking two shoots from another fruitful olive, set in the extremities of the shoots from each side, so that they may come through at the opposite side; and taking hold of both shoots, draw them through with your hands; and when they are drawn in close as a wedge, cut the superfluous parts off from each side, that is, the parts of the shoots that protrude and smear the perforated places on each side with clay and chaff, and the tree will produce plenty of good fruit.

**IX.—CONCERNING THE CARE OF THE FULL-
GROWN OLIVES.**

CONCERNING the planting and culture truly then of the olive-trees, we have laid down sufficient

ficient instruction: and now follows information relating to the care of the full-grown olive-trees. Perform therefore the work, that is, the ablation, at that period, which is also prescribed in relation to the young^x plants. But it is proper that the digging to a considerable depth, and the laying on, and the quantity of the compost, and the depth of the mould, be in proportion to the stems, and to their size, and to the nature of the ground. It is indeed right to carry less compost to places where the plants shoot at a more early period, and to wet situations, and in an interval of many years; and to use the accumulation of mould more sparingly, lest the trees impelled to shoot hurt the fruit in its earliest^y infancy. But in situations that are more sterile and more dry, it is proper to bestow more compost, and speedily; and to raise^z the accumulation of mould higher to the stems, that they may shoot more successfully by means of the compost; and that they may not be scorched by the sun by means of the accumulation. But bestow on the full-grown olives, already mentioned, a thorough pruning, as well as

T 2

on

^x 3, 13, and 5, 20.

^y In its blossom, in the Greek.

^z To use, in the original.

on other trees, in the autumn, after the setting^a of the Pleiades; for at that season the trees seem to be more firm and more strong; for it happens to them first, that the moisture has been drawn up for the support of the shoots, and for the nourishment of the fruit: and secondly, because the moisture left after the summer's heat, is dried up: and thirdly, because they have not yet received the winter's showers; so that, for all the reasons already enumerated, the season of the autumn is the most adapted to prune trees, which are then very strong, and especially the olive. But it is necessary that he who is going to prune, should first manure, that the utility of the compost may be opposed to the injury from the pruning; for the trunks that are thoroughly pruned suffer during the time, on account of the wounds; but when manured they soon recover, and they shoot more speedily. But it is requisite to prune the dry wood, and what grows from the middle of the tree, that^b it may have free air: and it is proper to take away the branches that lie one on another, and to study the thinning of them; and indeed to cut off the crooked branches, and especially such as are too long, and those that

^a About the sixth of the ides of November.

^b "That it may have respiration," is the Greek phrase.

that grow into immoderate length, being naturally steril. For it has for this reason been reckoned among all farmers that olive-trees ought not to be more than ten cubits long, and that a length beyond this is hurtful, the branches being broken by the vehemence of the winds, and the blossoms disturbed, and falling off before the time. Wherefore many draw the branches of the plants down to the ground, making the tree become lower and more depressed. We have now said enough concerning the pruning of the full-grown olives, which it is proper to perform for three or four years. You are likewise to remove every year the branches that grow on the trunks^c, while they are yet tender, that the trunk may not suffer inconvenience from them.

X.—HOW ONE MAY MAKE OLIVE-TREES FLOURISH AND PRODUCE PLENTY OF FRUIT; AND HOW ONE MAY CURE THEM, WHEN THEY ARE DECAYING.

You will render the olive-trees more thriving, and more flourishing, and exceedingly fruitful, if, after digging round the roots, you pour over each root two cotylæ of amurca, from olives that

T 3

have

^c The Greek word means the lower parts of the trunks.

have not been salted, equally mixed with river-water; or a basket or two of bean straw, in proportion suitable to the tree; or potters earth mixed with cow-dung, or so much sea-weed. Stale urine also poured down the trunk is not less useful. But it is necessary after this immediately to heap on mould, laying it around from the roots to the height of two palms; and to make an excavation round the accumulated mould for the reception of rain-water. It is indeed proper to apply this remedy during the heat of the Dog-star. It is also of greater utility to use rigation at that period, and especially if there is a drought. But you are to make trees that are steril bear fruit plentifully in this manner: making^d an opening, about the measure of a cubit, from the lower end of the trunk, and perforating the trunk down to the south side with an auger, forming a hole of the size of one's middle finger, and boring the trunk quite through; then taking two olive shoots from another tree, that has always been fruitful, fill the holes on each side, so that both the shoots may come quite through; and taking hold of them, draw them forcibly; and when

^d *Αποσχών*. This term was applied in physic to scarifying and opening a vein.

when the hole is, as it were, wedged^e on both sides, the shoots having been equally drawn, cut off the superfluous parts on each side, and cover the holes with clay^f and straw: and as you would wish the olives to prove, you should set in such shoots as it has been prescribed; for thus the olive-tree will produce better oil, the shoots of a plant that used to bear good oil-fruit having been set in. But it is necessary to take the shoots from the southern side of the tree. You will also remedy the olive-trees that are too luxuriant, that is, that produce a multiplicity of leaves, but little fruit, in this manner: fix a piece of the wild olive, or of the pine, or of the oak, or a stone, in the roots. You will also thus remedy those that indeed bear much fruit, but do not afterward ripen it, as well as those that inauspiciously shed their flowers: having dug round the trunk, throw over one of superior size, indeed two baskets of sea-weed, and over one of inferior size a less quantity; having then mixed amurca with river-water, pour four congi^g down each trunk; and if there is no sea-weed, use the

T 4.

amurca

^e i. e. well closed, as a fissure with a wedge.

^f The expression in Greek implies that they were mixed.

^g Τετραχον, a measure of four χοες.

amurca alone. But in relation to the remedy against noxious animals, and the injury from the circumambient air, we have given instruction in general terms, in the discourse^a relating to vines. It is then necessary, if you find the roots dry and morbid, to know that worms bred at the bottom are the cause, which you are indeed to destroy by many methods, as it has been already mentioned, but particularly by the plantingⁱ of squills.

XI.—THAT THE PLANTATION OF THE OLIVE IS EFFECTED IN MANY AND DIFFERENT WAYS.

It is proper also to know that what is planted is sometimes indeed buried in the ground, and sometimes a part of it committed to the soil, and a part lies above it. Those things then that are totally covered want no kind of mark when they are selected; but it is proper to plant those that in part lie out of the ground, as they primarily had the stem to the east, or to the south, or to the west, that they may not suffer from the novelty of the air. You are also to water the plants twice or^k thrice, if possible, when there are no showers; and

^a 5, 48, &c.

ⁱ 2, 10, 90, &c.

^k And, in the Greek.

and you are to set in the trenches on each side of the plant two sticks, even and straight, or reeds, or dead shoots tied together, so that they may lie above the trenches; and when the plant is trodden down, you¹ are indeed to finish the covering of it; and you are to fill up the vacant places with small stones or shells; and you are to cover them with a larger stone, that the rain-water may have access to the roots. But it is necessary to take the plants immediately to set in moist weather. But the planting of the olive is effected various ways. For some indeed plant it from cuttings; for they take the thicker branches and saw them to the length of a cubit, and so plant them. Some likewise plant them thus from truncheons: having sawn off the thicker branches to the length of two cubits, they set at the bottom of the trench a wide stone; then fixing the plant on this, they immediately throw on the mould. Some also plant the most generous of the suckers with the stem. Some likewise prune the plants they are going to take with a pruning-knife, while they are on the stem, and they set them in the trenches about the rising of Arcturus^m. Others
plant

¹ This passage seems to be of questionable authenticity.

^m Columella says it rose on the noënes of September; Pliny says it rose about a week later.

plant what are called *tropææ*^a in this manner: having marked them with red earth, how they stand to the east and to the south, they saw them from the stem, four or five cubits; and they set them in the trenches, bestowing on them every due attention. This mode of planting, if it succeeds, quickens more readily, and produces fruit more speedily. Some also plant thus from stems: having cut the stems into sizeable pieces, they lay the pieces, having the bark upward, in the trench, and having laid on mould with compost, a palm high, they let them remain. Some likewise having cut off thin pieces four palms long, with the bark from the part of the stem underground, lay a stone at the bottom of the trench; and they lay three or four of the thin pieces round it; and they cover them a palm deep. In what way soever the plantation is effected, let the plants be sawn; and you are carefully to observe, that the bark may not be lacerated; and you are to trim the wound with a sharp knife, keeping the bark closely cut; and you are to smear the lower end of the cutting with cow-dung mixed with ashes. It is also necessary to observe

^a From their resemblance to the trunks, called *trunkies*, so called, because they were fixed where an enemy had been turned to flight.

observe, that the cutting may not be set with its head downward; for we torture the plant when we set it thus inverted. It is moreover requisite to throw manure into the trenches.

XII.—THAT THE FRUIT OF THE OLIVE MAY NOT FALL OFF.

THE fruit of the olive will not fall off, if taking a bean that is faulty, you stop the faulty^o part with wax; then taking a clod from the root, and setting the bean, you are to cover it.

XIII.—CONCERNING THE PRUNING OF OLIVES.

It is right to prune the olive after it is disburthened of its fruit; and do not persuade yourself that the fruit is more scanty, when considerable branches are removed; for you will have a more abundant crop of fruit from the young shoots.

XIV.—CONCERNING THE OLIVE GRAPE.

It is worthy of observation, and we must not pass by without taking notice of the attachment of the olive to the vine, which Florentinus mentions

^o The hole, in the Greek.

tions in the eleventh book of the Georgics: for he says, that if any person grafts the olive on the vine, not only clusters of grapes grow from it, but olives also: and he says that he saw such a tree at Marius^p Mascimus's, and that he tasted of the fruit, and that it seemed to taste at the same time of the grape-stone and of the olive kernel. He also says that such plants grow in Libya, and that they are in the language of that country called *oubolima*^q. You are also to set poles underneath, strong enough to support the weight of the olive; but if we graft another way, we may have no need of poles: for having bored the vine to the ground, we may set in the olive shoot, that it may participate of the sweetness of the vine, and of the natural and nutritious quality of the ground. But we shall receive its fruit with less trouble, when it does not bear on the vine, if we take shoots from it^r and transplant them; for when rooted by itself, it will preserve its mixed flavour, and the fruit from it is called the olive grape.

XV.

^p A prefect of the city, A. D. 218. Dio Cassius, lxxviii. 142.

^q A corruption from *uvoliva*, by changing the *v* into *b* and *m*, which were called letters of the same organs. The word seems adapted to the genius of the Arabic.

^r After it has been grafted on the vine.

XV.—CONCERNING MANURE ADAPTED TO THE OLIVE.

EVERY kind of manure is suitable to the olive except human fæces ; but you ought not to throw the manure down on the roots, but at a little distance from the stems ; and it is proper to manure the olive-trees during two or three years ; and he that plants the olive ought by all means to throw manure into the trenches, and to mix it with the mould.

XVI.—CONCERNING THE GRAFTING OF OLIVES.

SOME olive plants indeed have a thin, and some a thick bark. You are then to graft those that have a thick and moist bark, in the bark ; and those that have a thin and dry bark, in the wood. But the time of this grafting is from the *9th of the* calends of June, that is, from the twenty-second of the month of May, to the calends of June. It is also proper frequently to water the olives that have been grafted, when they are dry ; but some also graft them on the roots that remain out of the ground.

XVII.

**XVII.—HOW AND WHEN IT IS NECESSARY TO
GATHER AND TO HARVEST THE OLIVES.**

THE proper season for the preparation of the common oil is when more than half of the fruit appears to be getting black. But it is necessary to accelerate the gathering before the frost sets in, for the trees will afford a less^{*} laborious and a more abundant crop. But it is necessary to gather the fruit when it is fine weather, and not rainy; for a wet shoot is weak and easily broken; on which account it is neither proper to disturb the branches, nor to gather the fruit, when small rain falls, before the wet is thoroughly dried[†] from the plants: and where the soil is miry, you are to spread a mat or some such thing; but if you have nothing of this kind, it is proper to wash the olives with warm water; for, besides the cleaning of them, we shall likewise find more oil. Wherefore, if it be possible, although they may not be dirty, it is proper to wash them with warm water. Some, acting with propriety, only shake the branches with their hands, that the fruit may drop, and they do not apply a stick
to

* Because the olives might be pressed with less trouble.

† Removed, in the Greek.

to the olive, because it afterwards bears more scantily; but the fruit coming down with violence is wounded, falling upon stones or upon hard clods; and partaking of the quality of the soil, it will make the oil feculent. It is necessary then to prepare triangular scaffolds, and to lay a wide board upon them, that standing upon it they may gather the olives.

XVIII.—HOW OIL MAY BE MADE WITHOUT OLIVES.

THE fruit of the Terebinthus^u being ground in the mill as the olive, and being pressed, produces oil: and the refuse does^v for pigs to eat, and for burning. Sesamus^w also makes oil, and the walnut, the shell having been removed, that is, when they are pressed.

XIX.—THE MAKING OF OMPHACINE OIL.

It is yet proper to know from^x the signification of the term, that the premature olives make the omphacine

^u Turpentine tree.

^v Πουρ.

^w The oily grain.

^x Ομφαξ signifies a grape, but here an olive, before it comes to perfect maturity.

omphacine oil. When you then see the olives beginning to exhibit signs of maturity, order the boys or the labourers to gather them from the tree, with their hands, observing that none of them may fall on the ground : and it is proper to take every day such a quantity as may be wrought the following night, or the night after. Spread them however, when gathered, on light hurdles, that the watery moisture that is in them may be dried, and that no injury may arrive from their heating : and you are to gather the leaves and feculence among them ; for these things being mixed are adverse to the keeping of the oil : then taking the olives in the evening, besprinkle them with salt, and put them into a mill, which is clean, and grind them gently with your hand, that the refuse of the olives may not be ground along with them ; for the watery fluid from the refuse injures the oil. It is therefore necessary that the wheel may be turned round briskly and lightly, that the flesh and the skin of the olive may be only pressed ; and after the grinding, carry what is ground in small trays to the press, and lay in frails made of willow, for the willow contributes much to the beauty of the oil ; then lay on a light and not a burthensome weight, for what flows from light pressure is very sweet and very thin,

thin, which, when you have drawn it into clean vessels, order to be kept by itself: press again the olives that are left, and lie underneath, with a little heavier weight; and keep this also by itself, for this indeed will be a little inferior to the first, but better than what follows. But it is proper to throw a little salt and nitre to both of these, when they are drawn into another vessel, and to stir them with an olive stick, and let them afterward remain until they subside, and you will be sure to find the watery fluid rest at the bottom, that is, the amurca, and the richest fluid swimming on the surface above it, which it is expedient to take without the amurca, and to pour into a glass vessel; for the glass being naturally cool, will keep the oil exceedingly well; for the nature of oil likes the cold: but if you have no glass vessels, pour it into new jars smeared in the inside with gypsum, and set them in dry situations toward the north; for oil likes to be in a dry and cool place; for heat and moisture are inimical to oil.

XX. — PREPARATION OF SWEET-SCENTED OIL.

Put into a jar during ten days eight sextarii of sweet wine, that is, of that which is called

must, and two sextarii of oil, and a good quantity of pounded iris, having tied it: and afterwards use the oil, having percolated it. This liquor is fit for women to drink.

XXI.—HOW ONE MAY MAKE OIL FINE.

HAVING heated salt on the fire, throw it into the oil, while it is hot. The cone of the pine, when burnt and thrown in hot, does the same thing, as do the root of the citron, and the parched faeces of the oil.

XXII.—TO CURE RANCID OIL.

BOIL white wax with good oil, and pour it in while it is liquid: and having heated some salt, throw it in, while it is hot. But it is proper to know that you are to keep every oil in a place under-ground; and that fire, or the sun, or boiling water, if a brazen vessel, or some other that will not break, is set in it, makes oil fine. Anise thrown in will cure rancid oil: and if you take anise and throw it in, it will not become rancid.

XXIII. — TO CURE FETID OIL.

HAVING pounded some green olives without feculence, throw them into the oil vessel, when the sun is hot. But if you have no olives, having bruised the tender shoots of the tree, you are to do this. Some indeed throw both in, having tied them in a cloth, and having mixed them with pounded salt. But it is proper to take out the cloth after three days, and to stir the oil: and when it has settled, it is proper to pour it into another vessel. Others, having heated old bricks red hot, throw them in. Others having crumbled dry barley bread, and having wrapped it in a cloth of loose texture, throw it in; and having done this twice or thrice, they finally throw in some concremented salt, and they pour it again into a clean vessel. Others, having rubbed melilot with oil, lay it in the oil a day and a night.

XXIV. — TO MAKE TURBID OIL FINE.

HAVING poured the oil into a vessel having a wide mouth, set it in the heat of the sun; and when it is hot, besprinkle some fine parched salt over it; and when it has formed a sediment, pour

it into another vessel. You will also make feculent oil clear in this manner: having pounded the bark of the olive, and some of the sprays, and salt, and having tied them all in a cloth, suspend them in the vessel.

XXV.—IF A MOUSE, OR ANY OTHER ANIMAL, HAVING FALLEN INTO THE OIL, HAS HURT ITS FLAVOUR.

SUSPEND a handful of coriander in the oil, and if the unsavoury smell remains, change the coriander. Some indeed, having dried the coriander in the shade, and having pounded it, throw it into the oil. Others having dried fenugreek in the sun, lay it in the vessels: but it is better to extinguish the red-hot coals of olive wood in the oil. Others take dried grapes without the kernels, and pounding them, throw them in; and after ten days they take and press these grapes, and they pour the turbid oil into another vessel. Others likewise, having pounded dried grapes in a mortar, the kernels having been left, throw them into the oil.

XXVI.

XXVI.—TO MAKE OIL LIKE SPANISH OIL.

Pour a triple quantity of water, not too hot, and a little salt pounded and well mixed with it, into oil clear from amurca, quite hot; and moving and stirring it, that the whole may be well mixed, suffer it to rest some time, until the water that is poured in may subside in the manner of amurca: then taking the oil on the surface with a vessel, that is, with a skimmer^r, and again stirring it in the same manner with warm water, and doing the same thing, remove the remainder of the clear oil: then mixing the juice of tender leaves of the olive pounded, that it may take away a certain sharpness and bitterness, with the subsiding oil, use it after three days, or even the same day. But others pouring omphacine oil, or some other good oil, into a mortar, work it around; and when it is necessary, they use it as Spanish oil.

XXVII.—TO MAKE OIL LIKE ISTRIAN OIL.

Throw into omphacine or other good oil, some dry elicampane, and laurel leaves, and dry cyperus,

^r Κορυνη; thus called, because made in the shape of a shell.

perus, all pounded and made quite fine; then mixing them by sufficiently stirring them : when it has subsided, keep it during three days or more, and boil it down to a third part. This is what is called Liburnian oil, and the Istrians^a give it this name.

XXVIII.—THE BEST COMPOUND OF OLIVES.

TAKE large and whole olives gathered with the hand, cut them around with a sharp reed, and so throw them into a new vessel not yet pitched, and sprinkle some very fine salt over them; and when it is dissolved, have some honey in readiness in another vessel, if it is indeed convenient, but if not, some sapa and citron leaves, and pour the olives into this preparation so that the liquor may cover them. But some likewise mix with the preparation fennel seed, and carnabadium^a, and parsley seed, and anethum^b; and they make the olive compound altogether admirable, which is to many persons unknown.

XXIX.

^a Istria lay on the coast of the Adriatic, between Liburnia and Aquileja.

^a Ethiopic Cumin.

^b Dill.

XXIX.—OXYMEL COMPOUND OF OLIVES.

TAKE the long olives with the shoots on which they grew, the best, and those that are black, wholly unhurt; then washing them with cold water, dry them on hurdles; and so throwing them into a hollow tray, pour oil on them, and sprinkling one chœnix^c of pounded salt over nine times that quantity, move them gently with your hands, that they may not be bruised: then throw the olives into the vessel, pouring oxymel over them, and let the liquor cover them; and having then closed them with sprigs of fennel, lay them by.

XXX.—THE MUST COMPOUND.

HAVING gathered the white olives, they macerate them in sea-water during six days; they then lay them in a vessel, and pour fresh must upon them; but they do not wholly fill the vessels, that the must may not, in fermenting, run over; and when it has fermented, they stop it. Some indeed, first throwing in a handful of salt, pour in the must, and then the olives; and when it has fermented, they stop it.

XXXI.

^c 1 pint 15.7064 sol. inches.

XXXI.—OLIVE COMPOUND WITH REFUSE OF GRAPES.

Pour the fresh relics, before they are pressed, into a vessel, alternately with the olives; then stop it.

XXXII.—CONCERNING POUNDED OLIVES.

HAVING taken the more healthy olives, before they become black with ripeness, and having bruised them in a wooden vessel, throw them into hot water; then having taken them in a basket and pressed them, throw on some salt, not well pounded, and having laid on a handful of salt, close them with sprigs of fennel. Others, having bruised the olives, take out the stones, and sprinkle some pounded salt with cumin and sprigs of fennel over them; they then pour in some good must, and they stop them.

XXXIII.—CONCERNING THE OLIVES CALLED COLUMBADES.^d

TAKING the large olives called *columbades*, when they are come to perfection and turn black,
with

^d So called from the circumstance of their swimming in the brine: they were sometimes called *νυτράδες*. Athenæus says,

with the pedicles on which they stand, be careful that, when they are thrown into a large vessel, when they are removed, they may not be bruised: then washing them in cold water, dry them gradually in baskets^e in the shade for a day, and turn them gently, that they may be equally dried; then throw a handful of parched salt into the bottom of the vessel, and pour in four congii of the second^f pickle with three cotylæ of vinegar, and throw in twenty chœnices of olives, and fill the vessel, and stir it: and let the liquor come to the top; then, closing it with fennel, stop it. But we have prescribed that the pickle ought to be first poured in, that the olives, when thrown in, may not be bruised. But others, taking them with the tenderest shoots, throw them in a vessel having sea-water; and letting them remain during four or five days, they take them up, and throwing them into vessels with pickle, they stop them. But these things are done before the winter solstice.

the ancients used food, to whet the appetite, as well as pickled olives, which they call *columbades*. Lib. iv. p. 133.

^e Called. *ταραποι*. They were used by the Greeks for this and for other common purposes.

^f The oxymel recommended in the 29th Section.

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Ill health prevented the Translator from correcting the Press.